

CLASS 525, SYNTHETIC RESINS OR NATURAL RUBBERS -- PART OF THE CLASS 520 SERIES

SECTION I - CLASS DEFINITION

Class 525 provides for all processes or products wherein a solid polymer is chemically modified or admixed with an additional solid polymer. It also provides for processes or products involving nonsolid specified intermediate condensation products which are admixed with an additional specified intermediate condensation product or specified polymer forming ingredients. In addition, this class provides for vinyl alcohol polymers or modified forms thereof and for polyesters admixed with an ethylenic reactant.

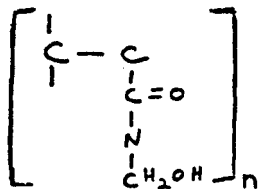
SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

(A) Listed below are rules to be followed in placing patents into and in determining the appropriate subclasses to be searched in Class 525.

(1) ETHYLENIC POLYMERS — The following rules are applicable to subclasses 55-388.

(a) When a polymer derived from ethylenic reactants only is not specified as a liquid or terms which are generally regarded as indicating a liquid (e.g., wax, waxy, etc.) it will be regarded as being a solid (e.g., polyethylene, polystyrene, etc.).

(b) Products are classified on the basis of their preparation. A product identified by a structure is to be placed with the process of its preparation; for instance, a product identified, as illustrated below, and which product from the disclosures is prepared by the reaction of polyacryloamide and formaldehyde is classified on the basis of polyacryloamide reacted with formaldehyde in a case involving rubber (e.g., halogenated, etc.) classification is on the basis of a solid polymer derived from isoprene.



(c) All subclasses are based on a process of mixing.

Products, per se, therefore are classified on the basis of the process of mixing.

(d) All solid polymers (subclasses 191+) are classified on the basis of the initial solid polymer derived from ethylenic reactants (e.g., a mixture of a halogenated polybutadiene and polyethylene is classified as an original in subclass 232 rather than as a halogen containing reactant, for example, in subclass 213).

(e) A process of halogenating polybutadiene and subsequently blending same with polyethylene is classified as in (D) above.

(f) In those subclasses which require the combination of two or more reactants (e.g., subclass 165 or subclass 178, etc.) the two reactants need not be added simultaneously to the ethylenic polymer, nor need they be reacted together prior to addition with the ethylenic polymer. They may be added subsequently, or there may be an intermediate reactant which is not, per se, the type required in these subclasses (e.g., other than amine, polycarboxylic acid, polyol, etc.). However, if the intermediate reactant is provided higher in the schedule (e.g., isocyanate, polyepoxide) it is classified in the higher provided subclass, etc.

(g) Compositions which have been admixed and are not in a reacted state are classified on the basis of the reactants in the schedule hierarchy.

(h) The following rules apply to subclasses 100+, 107+, 123+, 132+, 153, 154+, 165+, and 178+. Each of the above subclasses provide for:

(i) The reaction of an ethylenic polymer and a saturated reactant required by that subclass or polymer thereof (e.g., aldehyde, phenols, etc.).

(ii) The physical blend of an ethylenic polymer and a solid polymer derived from a saturated reactant required by that subclass.

(iii) The physical blend of an ethylenic polymer and a solid polymer derived from at least one ethylenic reactant required by that subclass and at least one saturated coreactant.

(iv) The mixture of an ethylenically unsaturated polymer and a specified intermediate condensation product, specified polymer forming ingredients, or solid polymer thereof, which is other than solely derived from ethylenic materials and wherein an ingredient required by that subclass is ethylenic and is part of the specified

intermediate condensation product, specified polymer forming ingredient system, or solid polymer; or wherein the material required by that subclass is ethylenic and is in addition to a solid polymer, polymer forming ingredient system, or intermediate condensation containing at least one saturated reactant.

(v) Excluded from these subclasses are those processes or products wherein an ethylenic polymer is admixed with ethylenic material (e.g., polyacrolein or acrolein) only or polymers thereof.

(vi) Included herein are those situations wherein a treatment is effected on a polymer with part of a specified polymer forming ingredient system and in which a later reactant is added which forms a specified polymer-forming ingredient system therewith. The ethylenic reactant which is required by that subclass can be part of the polymer-forming ingredient system or it may be part of the specified intermediate condensation product.

(2) CONDENSATES - PROCESSES: The following rules are applicable to subclasses 389-540.

(a) Processes of preparing products are classified with the product in the absence of any specified process subclass.

(b) Processes of treating a previously treated product are classified on the basis of the original solid polymer originally formed, e.g., treating a starting halogenated polyamide with an epoxy is classified as an original in the first appearing subclass of the schedule that provides for treating a polyamide with a halogen or epoxy, etc. If the process of preparing the starting materials is not claimed and the claimed step is provided in a lower subclass than the process if claimed of preparing the starting material, then a cross-reference into the claimed process is appropriate, e.g., Schedule reads as follows:

Polyamide

. treating with halogen

. treating with epoxy

Claim reads:

Halogenated polyamide is treated with an epoxy. The original is placed into the halogen subclass and should be cross-referenced into the epoxy subclass. If, however, the steps of halogenating and epoxidizing are claimed, the original is placed into the halogenating subclass and

a cross-reference into the epoxy subclass is deemed to be optional.

(c) When a condensate polymer is not specified as a solid or identified by properties which identify it as a solid e.g., melting point, etc., then it is considered a liquid and as such is treated as a reactant.

(d) When a condensate polymer is noted in generic terms or is identified by a trade name or manufacturer, it is to be regarded as follows:

polyester = reaction product of a saturated dicarboxylic acid or derivative and ethylene glycol.

polyamide = reaction product of a saturated dicarboxylic acid or derivative and a diamine.

polyamide = identified as a nylon 6 is the reaction product of a caprolactam.

polyphenyleneoxide = reaction product of a monohydric phenol.

polyarylene sulfide = polyphenylene sulfide reaction product of an alkali metal sulfide reactant and a halogenated aromatic reactant.

polyoxymethylene = formaldehyde polymer.

polycarbonate = reaction product of halhal or OO and a dihydric aromatic dialcohol.

polyurethane = reaction product of $R-(N=C=X)_2$ (X is chalcogen) and ethylene glycol.

polyurea = reaction product of $R-(N=C=X)_2$ (X is chalcogen) and a diamine.

novalac = reaction product of formaldehyde and a monohydric phenol.

resole = reaction product of formaldehyde and a monohydric phenol.

aminoplast = reaction product of formaldehyde and an amine.

phenoplast = reaction product of formaldehyde and a monohydric phenol.

(e) In a multistep process of treating a polymer the first

appearing step of treating in the schedule array provides for the original placement.

Claim reads:

polyamide treated sequentially with X, Y, and Z

Schedule reads:

polyamide

. treating with y

. treating with z

. treating with x

The original with Y, which is the first appearing subclass in schedule

(f) In those processes wherein two reactants are required to treat a solid polymer material (e.g., polyamide treated with a polyol and a polycarboxylic acid, the polyol and carboxylic acid can be added concurrently, sequentially, or even an intermittent step of adding material between the addition of the polyol and polycarboxylic acid may be involved).

(g)(i) In a multistep process wherein materials are reacted together and an intermediate solid polymer is formed which is subsequently reacted, all of the materials recited up to the step of preparing the intermediate solid polymer are regarded as reactants in preparing a solid polymer, and all materials which are reacted with the intermediate solid polymer are regarded as treating agents.

A + BC (no identity recited) to solid

C + D[E] Intermediate solid polymer [E] hal" hal [E]

(ii) Reactants to prepare intermediate solid polymer are A, B, and D.

A + BC (no identity recited as to solid nature)

C + DE D is a solid polymer higher in schedule array than (C) if it were a solid polymer, therefore classified as original with (D)

(iii) A + BC (no identity as to solid nature)

C + DE D is a solid polymer lower in the schedule array than C if C was solid.

Classified as original with (D) and cross-referenced to (C). In this situation (C) is regarded for cross-referencing purposes as if it were a solid.

(h) A process of preparing a reactable composition is classified on the basis of the reactants involved in preparing the composition.

(3) PRODUCTS - CONDENSATES

(a) All products must be classified on the basis of their preparation as indicated by the disclosure.

(b) When products are to be classified all rules to processes described hereinbefore are applicable.

(c) A method of preparing a polymerizable composition is classified as a process on the basis of the reactants recited in preparing the polymerizable composition.

(4) ETHYLENIC OR CONDENSATION POLYMERS For purposes of classification:

(a) A solid polymer is always considered as being a reactant.

(b) A solid polymer is always classified on the reactants utilized in its preparation, e.g., natural rubber is classified as based on isoprene.

(c) In this class once the solid polymer is identified, all modifications thereof are included in the indents thereunder "specified as mixed". For instance, mixing a solid polyphenylene oxide with a silicon modified polyester is classified in subclass 393. Subclass 393 provides for processes starting with or treating a solid polyphenylene oxide with a silicon containing reactant and subsequently admixing same with a silicon or nonsilicon containing polyester, or for processes of admixing a solid polyphene

nylene oxide with a silicon containing polyester, or treating a mixture of a solid polyphenylene oxide and polyester with a silicon containing reactant.

(d) Processes wherein two or more reactants (ethylenic or nonethylenic) are reacted at preferential conditions so that one reactant forms a solid polymer while the other reactant is substantially unchanged and which other reactant is then subsequentially reacted with the formed solid polymer are classified in Class 526, 527, or 528. When, however, such a product is admixed with an additional solid polymer, specified polymer forming

ingredients, or with a specified intermediate condensation product it is proper for this class (525). When the product is derived from ethylenic monomers only and is identified as a block or graft polymer and is subsequently admixed with an additional solid polymer, specified intermediate condensation product, or specified polymer forming ingredients, it is classified in this class (525) as if it were a block or graft copolymer. When the patentee discloses that a polymeric mixture is prepared by the interpolymerization of two or more reactants, A + B polymer, AB + polymer A, etc., such a product or process is proper in Classes 526, 527, or 528.

(e) Aftertreatment of a solid inorganic polymer with an organic compound to form an organic group containing polymer is proper in Class 526, 527, or 528. To be proper for this class (525) a solid organic polymer must be chemically treated.

(f) Patents in subclasses 192-196, 337, 338, and 503-508 which recite "chemical treating agent" are classified as follows:

(i) A "chemical treating agent" for purposes of this class is a chemical material which is added to the formed polymer and which causes or is present during a process wherein a change in a bond of the polymer is effected.

(ii) These subclasses provide for all chemical aftertreatments of a previously formed polymer derived from only ethylenic monomers when such aftertreatments are performed in the presence of a chemical agent, including treatments that are performed with chemical agents that are not specific as to identity or amount of the chemical agent, with the exception of mere reference to cross-linking, curing, or vulcanizing.

(iii) Claims are classified in these subclasses on the basis of the first-appearing material utilized as part of the chemical agent. No attempt has been made to classify on the basis of the chemically active material and therefore all materials in a composition are regarded equally (e.g., diluent, reactant, catalyst, etc.).

(iv) Claims to a composition or method of preparing (e.g., polymer plus a chemical reactive material) are classified as if they were process claims and as if the actual process has gone to completion.

(g) This class (525) includes processes of preparing solid polymers or resinifiable intermediate condensation products from a mixture of reactants wherein one of the initial reactants is used in an excessive amount with the expressed purpose of being used in a subsequent step to

form with an added reactant a specified polymer-forming mixture. The original reaction mixture must produce a solid polymer or resinifiable intermediate condensation product and the process must recite the addition of the added reactant which, together with the excess of original reactant, forms the specified polymer-forming ingredients.

(B) Listed below are lines between particular Class 525 subclasses and other areas (e.g., other Class 525 areas or other Classes).

(1) Lines relative to subclasses 192+

A chemical agent is a material which can react with the polymer to cause a modification in the polymer's chemical structure. Proper for this subclass would be, e.g., chemical reactions as halogenation, sulfonation, nitration, vulcanization, etc. Additionally, the treating agent if an ethylenic reactant, may preferentially homo- or copolymerize with other reactants to produce additional polymers. A patent which claims both product and process for producing a polymeric mixture containing a graft copolymer starting with two ethylenically derived polymers and an ethylenic reactant, requires that the original be classified Class 525 subclasses 192+ and should be crossed into the graft copolymer subclasses 63+. See Class 523, subclasses 1+ for a mixture of polymers with nonpolymeric material whose only purpose is, e.g., to enhance processibility of the polymers, stabilize against deterioration or aid deterioration after a given time (prodegradant), or act as a nucleating or crystallizing agent, etc. Search Class 528, subclasses 480+ for the treating of polymeric mixture in order to destroy residual catalyst or remove or neutralize impurities. However, the neutralization of a polymeric salt with an acid or base is classified here. Included here also are processes wherein one or more polymers are chemically aftertreated and subsequently blended with themselves or with other polymers.

(2) Lines relative to subclasses 242+

Subclass 242+ and indented subclasses also contain polymers prepared from a combination of ethylenic reactants mixed with nonethylenic reactants when reacted in the presence of ethylenically polymerized polymers, e.g., ethylene-ethylene oxide copolymer, propylene-sulfur dioxide copolymer. However, for the process of mixing such polymers see this class, subclass 185. Product claims are classified on the basis of ethylenic reactants either in the polymerized or unpolymerized state and cross-referenced to the nonethylenic reactant as being specified materials in this class, sub-

classes 244+. Process claims, of course, are classified according to claimed specified materials and, if lacking, then they are classified on the basis of the product.

(3) Lines relative to subclasses 267

This subclass excludes the presence of a preformed polymer derived from ethylenic reactants only. This subclass is to be clearly distinguished from subclass 244 wherein the solid polymer, whether or not prepared in situ, is contacted both by an ethylenic reactant and a specified material. In the present subclasses the in situ prepared polymer is contacted with an ethylenic reactant. Typically, the polymer is not isolated or purified but is further reacted with an ethylenic reactant. For example, styrene is contacted with lithium butyl catalyst which results in formation of lithium terminated polystyrene block. The in situ-prepared polymer is then reacted with butadiene to produce polybutadiene-polystyrene block copolymer.

(4) Lines relative to subclasses 326.1 through 388

(a) The following rules apply in classifying a claim into this area of the Class 525 schedule:

(i) For purposes of clarification in this part of the schedule, subclasses 326.1 to 334.1 are deemed to be chemically modified product subclasses; and subclasses 337 to 388 are deemed to be chemical modification process subclasses.

(ii) Patents that claim a chemically treated product and process, wherein both the product and the process are specifically provided for in the schedule, are classified in the product area (326.1 to 334.1) and cross referenced to the process area (337 to 388).

(iii) Patents that claim both a product (326.1 to 334.1) and a provided for process (337 to 388) and wherein the product is claimed in process terms are classified on the basis of the product (326.1 to 334.1) and cross-referenced to the process (337 to 388) on the basis of the chemical treating agent first appearing in the classification hierarchy.

(iv) Patents that claim a chemically modified product solely in process terms are classified on the basis of the product (326.1 to 334.1) and are desirably cross-referenced to the process (337 to 388) on the basis of the chemical treating agent first appearing in the classification hierarchy.

(v) Patents that claim nominally vulcanized, cured, or

crosslinked solid polymers from ethylenic monomers only, (or nominal process claims directed to vulcanizing, curing or cross-linking) are classified as polymers as appropriate in Class 526; see also Class 526, subclass 72 (1) Note (A8).

(vi) Patents that claim vulcanized, cured or cross-linked solid polymers from ethylenic monomers only, wherein the vulcanizing, curing or cross-linking agent is identified by an atom (e.g., sulfur containing vulcanizing agent, etc.), by an amount (e.g., cured using 2% by weight of a vulcanizing agent, etc.) or by a significant process step (e.g., cured by heating to a specific temperature in presence of a vulcanizing agent, etc.) are classified as chemically modified products (326.1 to 334.1).

(b) Claims to an aftertreated product are classified on the basis of the initial monomers or monomers that are polymerized; except where certain chemical modifications or chemical treating agents are specifically provided for as an indented subclass under a monomer. In certain cases this determination is made from the disclosure. An example of such a situation is a treated halogenated polyethylene wherein the disclosure recites halogenation of a previously formed polyethylene polymer. In this case, classification is made on the basis of polyethylene rather than on halogenated polyethylene.

(c) Vulcanizable compositions are not subject matter for this subclass unless prior to the vulcanization or cross-linking step there is present a chemically modified solid polymer derived from ethylenic monomers only.

(d) The final product need not contain an atom of the chemical treating agent employed. For example, polyvinyl chloride which has been treated with a dehalogenating agent, is classified in subclass 331.5.

(e) Examples of patent placement within this and the indented subclasses. Patentee claims:

(i) Polyethylene which has been chlorosulfonated by treatment with SO₂ and CL₂ at elevated temperature and pressure. There are also claims directed to this process of chlorosulfonation of polyethylene. The original classification is in subclass 333.9 with a mandatory cross-reference to subclass 344. This represents an inversion of the classification rule and process versus product in hierarchy of class 526.

(ii) A vulcanizable polyethylene composition comprising a mixture of polyethylene and zinc oxide as vulcanizing agent. The original classification is with the

process subclass 373 since this product claim does not encompass a chemically modified solid polymer.

(iii) A vulcanizable chlorosulfonated polyethylene composition comprising a mixture of chlorosulfonated polyethylene and zinc oxide as vulcanizing agent. Disclosure states that the chlorosulfonated polyethylene is prepared by modification of previously formed solid polyethylene. The original classification of this product is in subclass 333.9 since the product claim encompasses a chemically modified solid polymer, i.e., chlorosulfonated polyethylene.

(5) Lines relative to subclasses 501.5

Class 525, subclass 501.5 provides for, e.g., mixtures of phenol-formaldehyde resin (SICP) with an ethylenic agent such as an unsaturated fatty acid glyceride or unsaturated fatty acid derived therefrom, e.g., linseed oil or linseed fatty acid, etc. However, a phenolic SICP (not described as a solid polymer) admixed with a saturated fatty glyceride or saturated fatty acid, e.g., coconut oil or coconut fatty acids, etc., is classified in Class 528, subclass 158.5, since Class 525, subclasses 50+ do not encompass an admixture of a liquid SICP with a chemical treating agent; therefore, when saturated fatty glycerides or saturated fatty acid derived therefrom are reactants in the system of this subclass there must additionally be present a complete system for Class 525, subclass 480.

(6) Lines relative to subclasses 517.5

Class 525, subclass 517.5 provides for mixtures of SICP (e.g., aminoplast resin, etc.) with an ethylenic agent such as unsaturated fatty acid glycerides or unsaturated fatty acids derived therefrom, e.g., linseed oil or linseed fatty acid, etc. However, an aminoplast SICP (not described as a solid polymer) admixed with a saturated fatty glyceride or saturated fatty acid, e.g., coconut oil or coconut fatty acid, etc., is placed in Class 528, subclass 245.5 since Class 525, subclasses 50+ do not encompass an admixture of a liquid SICP with a chemical treating agent; therefore, when saturated fatty glycerides or saturated fatty acid derived therefrom are reactants in the system of this subclass there must additionally be a complete system for Class 525, subclass 509.

7

ETHYLENICALLY UNSATURATED REACTANT ADMIXED WITH A PRE-FORMED REACTION PRODUCT DERIVED FROM: (A) AT LEAST ONE POLYCARBOXYLIC ACID, ESTER, OR ANHYDRIDE; (B) AT LEAST ONE FATTY ACID GLYCEROL ESTER, A FATTY ACID OR SALT DERIVED FROM A NATURALLY OCCURRING GLYCERIDE, TALL OIL, OR A TALL OIL FATTY ACID:

This subclass is indented under subclass 1. Subject matter under Class 520, ... which are polyester-unsaturated reactant mixtures wherein (a) the polyester is prepared from a polycarboxylic acid, ester, or anhydride, and a polyol, and at least one fatty acid glycerol ester, a fatty acid or salt derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil, and (b) there is at least one unsaturated reactant other than solely fatty glyceride, an unsaturated fatty acid or salt derived from a naturally occurring fatty glyceride, tall oil, or an unsaturated fatty acid derived from tall oil, or mixtures thereof.

- (1) Note. Dehydrated castor oil or dehydrated castor oil fatty acids are treated as if they were unsaturated naturally occurring glyceride or unsaturated fatty acids derived from naturally occurring fatty glycerides.
- (2) Note. A buffering agent to improve storage stability is regarded as a catalytic agent and therefore treated as specified material.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms "specified material" and "fatty acid".

7.1

Mixed in the presence of a specified material:

This subclass is indented under subclass 7. Subject matter wherein a specified material is present.

SUBCLASSES

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "specified material".

7.2 Mixed with silicon-containing reactant or polymer derived therefrom:

This subclass is indented under subclass 7. Subject matter wherein there is additionally present a silicon-containing reactant or a silicon-containing solid polymer, SICP, or SPFI therefrom.

7.3 Mixed with aldehyde or derivative as reactant or polymer derived therefrom:

This subclass is indented under subclass 7. Subject matter wherein there is additionally present an aldehyde or derivative as reactant or a SP, SICP, or SPFI therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms "aldehyde" and "aldehyde derivative".

7.4 Mixed with previously formed solid polymer or SPFI:

This subclass is indented under subclass 7. Subject matter wherein there is additionally present another SP or SPFI system.

8 ETHYLENICALLY UNSATURATED REACTANT ADMIXED WITH A PRE-FORMED REACTION PRODUCT DERIVED FROM: (A) AT LEAST ONE POLYCARBOXYLIC ACID, ESTER, OR ANHYDRIDE; (B) AT LEAST ONE POLY-HYDROXY COMPOUND AND; (C) AT LEAST ONE NATURAL RESIN, PROTEIN OR BIOLOGICALLY ACTIVE POLYPEPTIDE, OR CARBOHYDRATE OR DERIVATIVE:

This subclass is indented under subclass 1. Subject matter under Class 520, ... wherein an ethylenically unsaturated reactant is admixed with a preformed polyester formed from a polyol; polycarboxylic acid, ester, or anhydride; and a natural resin, protein, biologically active polypeptide, carbohydrate, or derivative.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 54.1+, for a system under Class 525, subclass 50 containing chemically combined protein or biologically active polypeptide and a polyester or polyester forming SPFI system.
- 54.2+, for a preformed solid polyester (or polyester derived from ethylenic reactants only) chemically treated with a carbohydrate or derivative.
- 54.3+, for a previously formed solid polyester containing chemically combined carbohydrate admixed with a SP, SICP, or chemical treating agent.
- 54.4+, for a system under Class 525, subclass 50 containing chemically combined natural resin or derivative and a polyester or polyester forming SPFI system.
- 54.5+, for a system under Class 525, subclass 50 containing chemically combined coal, bituminous material or fatty still residue and a polyester or polyester forming SPFI system.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms "natural resin derivative", "protein", "biologically active polypeptide", and "carbohydrate derivative".
- 527, Synthetic Resins or Natural Rubbers, 100+ for polyesters containing chemically bound: cellular material derived from plants or animals; 200+ for protein or biologically active polypeptide; 300+ for carbohydrate or derivative; 400+ for lignin or tannin; 500+ for coal or bituminous material; 600+ for natural resin.

10 ETHYLENICALLY UNSATURATED REACTANT ADMIXED WITH EITHER (A) A POLYMER DERIVED FROM A SATURATED DI- OR HIGHER ESTER OF A POLYCARBOXYLIC ACID AS SOLE REACTANT, OR (B) REACTION PRODUCT OF ONLY POLYCARBOXYLIC ACIDS OR ANHYDRIDES WITH ONLY COMPOUNDS HAVING AT LEAST TWO HYDROXY GROUPS AT LEAST ONE OF WHICH IS SATURATED AND WHEREIN

THE REACTION PRODUCT FORMED IS NOT AFTERTREATED PRIOR TO ADMIXTURE WITH THE UNSATURATED REACTANT EXCEPT WITH A POLYCARBOXYLIC ACID POLYCARBOXYLIC ACID ANHYDRIDE, OR A POLYOL, AND WHEREIN NO SOLID POLYMER DERIVED FROM ETHYLENIC REACTANTS ONLY IS MIXED THEREWITH:

This subclass is indented under subclass 1. Subject matter under Class 520, ... involving a polymer derived from nonethylenic di- or higher esters of a polycarboxylic acid as sole reactant, or the reaction product of only polycarboxylic acids or anhydrides with only compounds having at least two hydroxy groups, at least one of which is saturated, mixed with at least one ethylenically unsaturated reactant and wherein the polymer or reaction product formed from the di- or higher ester or from the polycarboxylic acid or anhydride and polyhydroxy compound is not aftertreated prior to mixing with the unsaturated reactant except with a polycarboxylic acid, polycarboxylic acid anhydride, or a polyhydroxy compound, and wherein no solid polymer derived from ethylenic reactants only is mixed therein; processes of preparing or reacting the above mixtures and compositions resulting from the mixing or reacting processes.

- (1) Note. Included herein are all polyester-unsaturated reactant mixtures defined above except those cases in which the document specified that a mere diester is formed.
- (2) Note. Excluded from this subclass is a mixture of a polymer derived from an unsaturated carboxylic acid ester as sole reactant, e.g., diallyl phthalate, diallyl maleate, etc., and an ethylenic reactant.
- (3) Note. Excluded from this and the indented subclasses are those unsaturated reactants which have been prereacted and are part of a specified polymer-forming system (e.g., liquid reaction product of unsaturated diisocyanate and a polyol, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 55+, for a solid polymer derived from ethylenic monomers only mixed with the polyester-unsaturated reactant mixture.
- 242+, for a mixture of ethylenic reactant with a polymer formed of ethylenic reactants only.
- 418+, for those instances wherein the polyester is treated with reactants other than those specified in the title of this subclass if a solid polymer is formed.

SEE OR SEARCH CLASS:

- 528, Synthetic Resins and Natural Rubbers, for those instances wherein the polyester is treated with reactants other than those specified in the title of this subclass if the polyester is not a solid.

11 Mixed in presence of specified material or a polymerizable composition contains a specified material:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a di- or higher ester of a polycarboxylic acid as sole reactant or derived from a polycarboxylic acid or anhydride and polyhydroxy compound is mixed with an ethylenic reactant in the presence of a specified material which is not a reactant or wherein the polymerizable polyester-unsaturated reactant composition contains a specified material.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "specified material". The term as used usually includes solvents, catalysts, inhibitors, accelerators, etc.

12 Specified material contains boron or silicon atom:

This subclass is indented under subclass 11. Subject matter wherein the specified material contains a silicon or boron atom.

- 13 Specified material contains metal atom other than from group IA metal atom (Li, Na, K, Rb, Cs, Fr):**
This subclass is indented under subclass 11. Subject matter wherein the specified material contains a metal atom other than Group IA metal atom (Li, Na, K, Rb, Cs, Fr).
- 14 Material contains group IB metal atom (Cu, Ag, Au):**
This subclass is indented under subclass 13. Subject matter wherein the specified material contains a Group IB metal atom (Cu, Ag, Au).
- 15 Material contains group IIB metal atom (Zn, Cd, Hg) or IIIA metal atom (Al, Ga, In, Tl):**
This subclass is indented under subclass 13. Subject matter wherein the specified material contains a Group IIB or IIIA metal atom (Zn, Cd, Hg, Al, Ga, In, Ti).
- 16 Material contains group VB metal atom (V, Nb, Ta):**
This subclass is indented under subclass 13. Subject matter wherein the specified material contains a Group VB metal atom (V, Nb, Ta).
- 17 Material contains group VIII metal atom (Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt):**
This subclass is indented under subclass 13. Subject matter wherein the specified material contains a Group VIII metal atom (Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt).
- 18 Material contains group IVA metal atom (Ge, Sn, Pb):**
This subclass is indented under subclass 13. Subject matter wherein the specified material contains a Group IVA metal atom (Ge, Sn, Pb).
- 19 Material contains group IIA metal atom (Be, Mg, Ca, Sr, Ba, Ra):**
This subclass is indented under subclass 13. Subject matter wherein the specified material contains a Group IIA metal atom (Be, Mg, Ca, Sr, Ba, Ra).
- 20 Specified material contains phosphorus atom:**
This subclass is indented under subclass 11. Subject matter wherein the specified material contains phosphorus atom.
- 21 Specified material contains ketone group:**
This subclass is indented under subclass 11. Subject matter wherein the specified material contains a ketone group.

SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "ketone".
- 22 Specified material contains an aldehyde or derivative thereof:**
This subclass is indented under subclass 11. Subject matter wherein the specified material contains an aldehyde group or is a derivative thereof.

SEE OR SEARCH CLASS:
520, Synthetic Resins and Natural Rubbers, the Glossary for a definition of the term "aldehyde derivative".
- 23 Specified material contains sulfur atom:**
This subclass is indented under subclass 11. Subject matter wherein the specified material contains a sulfur atom.
- 24 Sulfur is part of heterocyclic ring:**
This subclass is indented under subclass 23. Subject matter wherein a sulfur atom is present as part of a heterocyclic ring.
- 25** This subclass is indented under subclass 11. Specified material contains nitrogen atom: Subject matter wherein the specified material contains a nitrogen atom.
- 26 Nitrogen is part of heterocyclic ring:**
This subclass is indented under subclass 26. Subject matter wherein a nitrogen atom is part of a heterocyclic ring.
- 27 Specified material contains a peroxy group, i.e., -O-O-:**
This subclass is indented under subclass 11. Subject matter wherein the specified material contains a peroxy group, i.e., -O-O-.
- 28 Mixed with -N C=X reactant or polymer derived therefrom (X is chalcogen):**
This subclass is indented under subclass 10. Subject matter wherein a polymer derived from di- or higher ester of polycarboxylic acid as

sole reactant or derived from polycarboxylic acid or anhydride and polyhydroxy compound is mixed with an ethylenic reactant and, additionally, is mixed with a -N C=X reactant or polymer derived thereof (X is chalcogen).

- (1) Note. The term -N C=X reactant includes blocked or masked isocyanates. See subclass 395 for a discussion of terms.
- (2) Note. Included herein are polyester unsaturated monomer mixtures which are aftertreated with an isocyanate reactant. In those instances wherein the solid polyester is reacted with the isocyanate prior to mixing with the unsaturated reactant, see this class, subclass 440.

29 Mixed with silicon-containing reactant or polymer derived therefrom:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a di- or higher ester of polycarboxylic acid as sole reactant or derived from polycarboxylic acid or anhydride and polyhydroxy compound is mixed with an ethylenic reactant and is additionally mixed with a silicon-containing reactant or polymer derived therefrom.

30 Mixed with a solid polymer or specified intermediate condensation product derived from at least one amine-, N-C(=X)- or N-S(-O)- containing reactant and at least one aldehyde or aldehyde-type reactant (X is chalcogen):

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a di- or higher ester of polycarboxylic acid as sole reactant or derived from polycarboxylic acid or anhydride and polyhydroxy compound is mixed both with an ethylenic reactant and with an amine and/or reactant containing a N or N moiety (X is chalcogen) and an aldehyde or aldehyde-type reactant or reaction product thereof.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "amine", "aldehyde", or "aldehyde-type".

31 Mixed with an 1,2-epoxy compound containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a di- or higher ester of polycarboxylic acid as sole reactant or derived from polycarboxylic acid or anhydride and polyhydroxy compound is mixed with an ethylenic reactant and additionally is mixed with an epoxy compound containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

32 Mixed with a phenolic reactant and an aldehyde or aldehyde-type reactant or reaction product thereof:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a di- or higher ester of a polycarboxylic acid as sole reactant or derived from polycarboxylic acid or anhydride and polyhydroxy compound is mixed with an ethylenic reactant and additionally is mixed with a phenol and an aldehyde or aldehyde-type reactant or the reaction product thereof.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms "aldehyde", "aldehyde-type", "phenolic reactant", and the definition of "carboxylic acid or derivative" for a discussion of "polycarboxylic".

32.1 Polymer derived from polycarboxylic acid and polyhydroxyl compound is derived from at least one polycarboxylic acid reactant which is a dimer or trimer of an ethylenically unsaturated aliphatic monocarboxylic acid having at least ten carbon atoms; or adducts of said unsaturated monocarboxylic acid with an alpha, beta ethylenically unsaturated carboxylic acid or derivative:

This subclass is indented under subclass 10. Subject matter wherein at least a portion of the polycarboxylic acid or anhydride is (a) a dimer or trimer of an ethylenic unsaturated aliphatic monocarboxylic acid having at least ten carbon atoms, or (b) adducts of said unsaturated monocarboxylic acid with an alpha, beta ethylenically unsaturated carboxylic acid or derivative.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

168+, for a system under Class 525, subclass 50 wherein the ethylenic group containing polycarboxylic acid or derivative is a dimer or trimer of an ethylenically unsaturated monocarboxylic acid having at least ten carbon atoms since these dimers and trimers are assumed to be ethylenically unsaturated materials unless otherwise specifically described as saturated or hydrogenated so as to substantially remove all residual unsaturation.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, under "fatty acid" for terms used in this subclass.

32.2 Ethylenic reactant or polymer derived from polycarboxylic acid or anhydride and polyol is derived from a carbohydrate or derivative:

This subclass is indented under subclass 10. Subject matter wherein a carbohydrate or derivative is chemically incorporated into the system either as the ethylenic reactant, or as part of a polymer derived from a polycarboxylic acid or anhydride polyol, and a carbohydrate.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, subclasses 238.2+ for a polymer produced from an ethylenic monomer having carbohydrate or derivative chemically bonded thereto.

527, Synthetic Resins or Natural Rubbers, subclasses 300+ for polyester resins containing chemically bound carbohydrate or derivatives.

33 Polymer derived from polycarboxylic acid and polyhydroxy compound is derived from at least one polycarboxylic acid containing at least three carboxyl groups or more than one anhydride group:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least one polycarboxylic acid containing at least three

carboxyl groups or more than one anhydride group.

(1) Note. Included here also is a polycarboxylic acid containing an anhydride and a carboxylic acid.

34 Polymer derived from polyhydroxy reactant and polycarboxylic acid is derived from at least one reactant containing at least three hydroxyl groups:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least one polyhydroxy compound containing at least three hydroxyl groups.

35 Polymer derived from polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least two polycarboxylic acid reactants or two polycarboxylic acid anhydrides or mixture thereof:

This subclass is indented under subclass 10. Subject matter wherein a polymer derived from polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least two polycarboxylic acid reactants or anhydride reactants or a mixture thereof.

36 At least one of said polycarboxylic acid reactants or anhydrides contains ethylenic unsaturation:

This subclass is indented under subclass 35. Subject matter wherein at least one of the polycarboxylic acid or anhydride reactants contains ethylenic unsaturation.

37 Polymer mixed with unsaturated reactant containing phosphorus atom:

This subclass is indented under subclass 36. Subject matter wherein the unsaturated reactant mixed with the polyester contains phosphorus.

38 Polymer mixed with unsaturated reactant containing nitrogen atom:

This subclass is indented under subclass 36. Subject matter wherein the unsaturated reactant mixed with the polyester contains nitrogen.

- 39 Polymer mixed with unsaturated reactant containing carboxylic acid, ester, salt, or anhydride group:**
This subclass is indented under subclass 36. Subject matter wherein the unsaturated reactant mixed with the polyester is a carboxylic acid, ester, salt, or anhydride.
- 40 Polymer mixed with unsaturated reactant containing aryl ring:**
This subclass is indented under subclass 36. Subject matter wherein the unsaturated reactant mixed with the polyester contains an aryl ring (e.g., styrene, etc.).
- 41 Polymer derived from polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least two polyhydroxy compounds:**
This subclass is indented under subclass 10. Subject matter wherein a polymer derived from polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least two polyhydroxy compounds.
- 42 Polymer derived from polycarboxylic acid or anhydride and polyhydroxy compound is derived from polyhydroxy compound containing ether linkage:**
This subclass is indented under subclass 10. Subject matter wherein a polymer derived from a polycarboxylic acid or anhydride and polyhydroxy compound is derived from a polyhydroxy compound containing at least one ether linkage (e.g., hydroxy terminated low molecular weight polyethylene oxide, etc.).
- 43 Polymer derived from polycarboxylic acid or anhydride, and polyhydroxy compound wherein at least one of the reactants contains ethylenic unsaturation:**
This subclass is indented under subclass 10. Subject matter wherein a solid polymer derived from polycarboxylic acid or anhydride and polyhydroxy compound is derived from at least one reactant containing ethylenic unsaturation.
- 44 Polymer mixed with unsaturated reactant containing two or more unsaturated groups:**
This subclass is indented under subclass 43. Subject matter wherein the unsaturated reactant mixed with the polyester contains at least two unsaturated groups.
- 45 Wherein unsaturated reactant contains three nitrogen atoms in the same ring:**
This subclass is indented under subclass 44. Subject matter wherein the unsaturated reactant mixed with the polyester contains three nitrogen atoms in the same ring.
- 46 Polymer mixed with unsaturated reactant containing nitrogen atom:**
This subclass is indented under subclass 43. Subject matter wherein the unsaturated reactant mixed with polyester contains a nitrogen atom.
- 47 Unsaturated reactant contains nitrogen heterocycle:**
This subclass is indented under subclass 46. Subject matter wherein an unsaturated nitrogen heterocyclic reactant is mixed with the polyester (e.g., N-Vinyl pyrrolidone, etc.).
- 48 Polymer mixed with unsaturated carboxylic acid, ester, salt, or anhydride:**
This subclass is indented under subclass 43. Subject matter wherein the unsaturated reactant mixed with polyester is a carboxylic acid, ester, salt, or anhydride.
- 49 Polymer mixed with unsaturated aromatic compound:**
This subclass is indented under subclass 43. Subject matter wherein the unsaturated reactant mixed with the polyester contains an aryl ring (e.g., styrene, etc.).
- 50 MIXING OF TWO OR MORE SOLID POLYMERS; MIXING OF SOLID POLYMER OR SPECIFIED INTERMEDIATE CONDENSATION PRODUCT WITH SPECIFIED INTERMEDIATE CONDENSATION PRODUCT OR SPECIFIED POLYMER-FORMING INGREDIENTS; MIXING OF SPECIFIED INTERMEDIATE CONDENSATION PRODUCT WITH AN ETHYLENIC AGENT; MIXING OF SOLID POLYMER WITH A CHEMICAL TREATING OR ETHYLENIC AGENT; OR PROCESSES OF FORMING OR REACTING; OR THE RESULTANT PRODUCT OF ANY OF THE ABOVE OPERATIONS:**
This subclass is indented under subclass 1. Subject matter under Class 520, ... which involves the mixing of a solid polymer with

solid polymers, with a specified intermediate condensation product (SICP), with specified polymer-forming ingredients (SPFI), with an ethylenic reactant, or with a chemical treating agent; or the mixing of a specified intermediate condensation product with a diverse specified intermediate condensation product, with specified polymer-forming ingredients, or with an ethylenic reactant; or processes of producing, or the resultant product of any of the above mixtures. The above combinations may be tabulated in a more easily recognizable form as follows in (1) Note below.

- (1) Note. Combinations proper for this subclass and its indents:

1. $P_1 + P_2$

2. $P + \text{SICP}$

3. $P + \text{SPFI}$

4. $P + \text{ER}$

$P = \text{Solid polymer}$

5. $P + \text{CTA}$

6. $\text{SICP}_1 + \text{SICP}_2$

7. $\text{SICP} + \text{SPFI}$

8. $\text{SICP} + \text{ER}$, wherein

$P = \text{Solid Polymer}$

$\text{SICP} = \text{Specified intermediate condensation product}$

$\text{SPFI} = \text{Specified polymer-forming ingredients}$

$\text{ER} = \text{Ethylenic reactant}$

$\text{CTA} = \text{Chemical treating agent}$

- (2) Note. A polymer is a solid when so stated or when it is described in one or more of the following terms. This list is not to be taken as limiting a solid to the enumerated terms. Other terms in patents not noted below may be interpreted as

being solid when proper description is given therein:

1. coagulated

2. brittle

3. ductile

4. Durran m.p.

5. elastic

6. elastomer

7. fiber-forming

8. friable

9. fusible

10. gum

11. meltable

12. melting point

13. millable

14. molten

15. pliable

16. powder

17. rubber

18. rubbery

19. thermoplastic

20. thermoset

A wax is not considered to be a solid even if defined by one or more of the above terms.

- (3) Note. Specified intermediate condensation product is limited to the following:

(A) Reactants noted in categories 1-3 below either as enumerated or with additional reactants, with the proviso that at least one of the reactants noted in 1-3

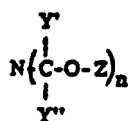
must be saturated, or (B) to the materials having the formulas set forth in categories 4-6. It must be remembered for purposes of classification that the structural formulas noted in 4-6 below are methylol compounds or derivatives thereof and are to be regarded as being a mixture of an aldehyde and the appropriate other reactant or reactants, with the proviso that at least one of the reactants used in preparing the methylol compound be saturated. In this regard, a methylol phenol is classified as if it were a mixture of formaldehyde and phenol, and methylol urea is classified as if it were a mixture of formaldehyde and urea.

(1) Reaction of an aldehyde or aldehyde derivative and/or an amine or compound containing an N or N moiety (X is chalcogen).

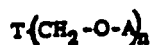
(2) Reaction of an aldehyde or aldehyde derivative and a phenolic material.

(3) Reaction of an aldehyde or aldehyde derivative and a ketone.

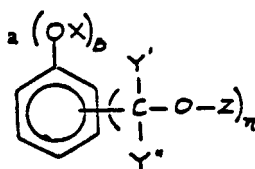
(4) A compound containing



(5) A compound containing a



(6) A compound containing a



Y' and Y'' are or hydrocarbon groups.

T - is an atom other than H or carbon of a carbon-substituted radical.

A - is a hydrogen or carbon atom and which carbon is bonded to only H, carbon, or single-bonded to oxygen atoms.

X - is H, part of an ether group, or an inorganic cation.

N - is two or more, B is one or more.

Z - is a H or carbon radical.

Compounds containing ethylenic unsaturation are not considered to be specified intermediate condensation products (see structures 4-6 under specified intermediate condensation products above) nor are methylol or methylol derivatives, per se.

- (4) Note. Specified Polymer-Forming Ingredients are Limited to: Those materials listed below under fourteen (14) different categories wherein at least one of each necessary reactants be utilized and that at least one be saturated. The term "poly" as noted in the specified polymer-forming ingredients area below is meant to include only reactants which are either (1) monomeric and in any physical state, or (2) polymeric but in a nonsolid physical state. The term "poly" designates that at least two of the required functional groups are present. In the classification schedule the term "necessary ingredients" has been utilized in some subclasses to include the combination of materials enumerated below (1-14) which must be present to have specified polymer-forming ingredients.

(1) aldehyde or aldehyde derivative and a phenolic material

(2) aldehyde or aldehyde derivative and an organic amine. Compounds containing ethylenic unsaturation are not considered to be specified intermediate condensation products (see structures 4-

6 above) nor are methylol or methylol derivatives, per se.

(3)aldehyde or aldehyde derivative and aC- containing moiety (X is chalcogen)

(4)aldehyde or aldehyde derivative and a hydrocarbon

(5)epoxides containing more than one 1, 2-epoxy group per mole

(6)organic compounds containing more than one -N=C=X (X is chalcogen atom) and an organic polyol

(7)organic compounds containing more than one -N=C=X (X is chalcogen) and an organic polyamine

(8)organic compound containing more than one -N=C=X (X is chalcogen) and a poly carboxylic acid or anhydride

(9)carbonic acid halocarbonate or a carbonate and a polyol

(10)halhal and a polyol

(11)polycarboxylic acid or derivative and a polyol

(12)polycarboxylic acid or derivative and a polyamine

(13)aldehyde or aldehyde derivative and a compound containing an organic N moiety

(14)aldehyde or aldehyde derivative and a ketone

(15)Materials which, present in the composition are either claimed or disclosed as being coreactable to form a solid polymer.

- (5) Note. An aldehyde derivative for purposes of this subclass includes (a) Compounds having a X-CH₂OH group wherein X is other than carbon or hydrogen. Included herein are paraformaldehyde, methylol derivatives of urea, nylon, and polyacrylamide, etc.; (b) Het-

erocyclic compounds having only carbon and oxygen as ring atoms in an alternating manner and in equal amount, i.e., (O-)_n; Included herein is trioxane; (c) Hexamethylenetetramine or its derivatives, as illustrated below. A derivative of this type requires the basic ring structure of hexamethylenetetramine but wherein the hydrogen atoms may have been replaced by other atoms.



- (6) Note. Compounds having a methylol group (-CH₂OH) bonded to atoms other than carbon, oxygen, or hydrogen are regarded for this subclass as being two compounds, one of which is formaldehyde. For instance, a methylol derivative of melamine is regarded as being a mixture of melamine and formaldehyde. Methylol urea is regarded as being a mixture of formaldehyde and urea.
- (7) Note. Paraformaldehyde polymer is regarded as a formaldehyde reactant.
- (8) Note. A resole is considered to be a specified intermediate condensation product even if the structure is recited. However, a novolak is considered to be a solid phenolaldehyde polymer.
- (9) Note. When nonpolymeric reactants A, B, and C, none of which is a specified intermediate condensation product, are mixed simultaneously under controlled conditions such that in a first stage one or two (e.g., A and/orB) of the reactants are caused to react to form a solid intermediate condensation product and the other reactants are caused to react later in the process, the claim is classified on the basis of the reactants which were introduced initially and not on the intermediate solid product unless a material is added subsequent to the formation of the solid intermediate and prior to the reaction of the final reactants.

- (10) Note. A specified intermediate condensation product has been limited to a condensation product of an aldehyde with at least one of phenol, phenol ether, inorganic phenolate, N, N- containing reactant (X is chalcogen) or ketone wherein the condensation product contains a plurality of methylol groups ($-\text{CH}_2\text{OH}$) or the partially or fully etherified product thereof ($-\text{CH}_2\text{OR}$). In those instances where it is unknown from the claims or disclosure whether methylol or etherified methylol groups are present, the document has been considered to have methylol groups and crossed to where it would be classified if no methylol groups were present.
- (11) Note. For purposes of this class all solid polymers are regarded as being reactants.
- (12) Note. Natural rubber is a solid polymer proper for this class. A natural rubber or modified form thereof is considered as if it were derived from a monomer containing two ethylenic groups, i.e., isoprene. See the Search Notes, *infra*.
- (13) Note. In order for a patent to be proper for this subclass and its indents, there must be a Desire or Intent to produce a composition of two or more solid polymers. Similarly the other mixing or forming or reacting processes of this subclass and its indents require an ultimate Desire or Intent to produce a mixture or reaction product. See Classes 526 to 528 for processes of in the presence of a previously formed solid polymer as a specified material, where there is no intent to form a composition or reaction product therewith.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 165+, for natural rubber + polyol + polycarboxylic acid or derivative.
- 232, for natural rubber + polybutadiene. This composition is considered as a mixture of two polymers, each of which is derived from ethylenic reactants only.
- 317+, for natural rubber + styrene reactant.
- SEE OR SEARCH CLASS:
- 528, Synthetic Resins or Natural Rubbers, subclasses 480+ for removing contaminants or undesirable materials from a solid polymer and wherein the polymer is not chemically modified, and, for example, for heating of a solid polymer by admixing with a heated fluidized bed of another solid polymer there being no intent to produce a composition).
- 51 Effecting a change in a process in response to a measurement or test:**
This subclass is indented under subclass 50. Subject matter wherein a process parameter is determined and some process parameter is altered in response to the determination.
- (1) Note. A test or measurement performed by a human being with a subsequent control operation is proper herein.
- (2) Note. Treating a material to a certain condition without a defined inanimate measurement, test, inspection, or control (e.g., temperature, pH, etc.) is not proper subject matter for this subclass.
- 52 Utilizing a tubular or loop reactor:**
This subclass is indented under subclass 50. Subject matter wherein a reaction is effected in a loop or tubular reactor.
- (1) Note. A loop reactor for purposes of this subclass is an apparatus wherein reactant material is circulated in a continuous path within a single or multicoiled or spiraled structure which has at least one inlet and outlet means and at least one reaction zone.
- (2) Note. A tubular reactor for purposes of this subclass is an apparatus wherein a reactant material flows in an essentially linear direction in a tube or series of interconnected tubes, which tube or tubes are of small diameter in relation to their length and wherein each tube has at

least one inlet and outlet means and one or more reaction zones.

53 Utilizing an apparatus with two or more physically distinct zones:

This subclass is indented under subclass 50. Subject matter wherein a reaction is effected in at least two or more physically distinct zones (e.g., regions, stages, etc.), said zones being part of a single reactor which has a plurality of such physically distinct zones or such zones may be part of separate reactors which are interconnected at some point.

- (1) Note. For the most part, the patents herein relate to advancement of materials from one zone to another so as to effect progressive degree of reaction and which are usually advanced until the degree of reaction is brought to the desired state.

54 Removing and recycling material from one zone to another:

This subclass is indented under subclass 50. Subject matter wherein a portion of material is removed from a zone wherein material is undergoing a reaction and the removed material either with something added to it, removed from it, or the removed material, per se, is added to a zone wherein a reaction is occurring.

54.1 Containing chemically combined protein or biologically active polypeptide:

This subclass is indented under subclass 50. Subject matter wherein a protein or biologically active polypeptide is chemically combined with the polymer system.

- (1) Note. The proteinaceous material can be present as a chemical constituent of a SP or SICP, as a reactant with a SP, SICP, or SPFI system, or as an ethylenic agent (in the case of a protein modified to have ethylenic groups).

SEE OR SEARCH CLASS:

- 528, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "protein" and "biologically active polypeptide".

54.11 Solid polymer treated by stepwise reaction with naturally occurring alpha or beta amino acid or a material which contains a residue of said amino acid, e.g., a functionally protected amino acid, etc.:

This subclass is indented under subclass 54.1. Subject matter wherein the biologically active polypeptide is generated by stepwise treatment of a preformed solid polymer with a naturally occurring alpha or beta amino acid or a material which contains a residue of said amino acid, or product of such a process.

SEE OR SEARCH CLASS:

- 435, Chemistry: Molecular Biology and Microbiology, appropriate subclasses for making and using enzymes.

54.2 Previously formed solid polymer chemically reacted with carbohydrate or derivative:

This subclass is indented under subclass 50. Subject matter wherein a carbohydrate or derivative is chemically reacted with a previously formed solid polymer (e.g., includes solid (SICP, etc.).

SEE OR SEARCH CLASS:

- 528, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "carbohydrate derivative".

54.21 Cellulose or derivative as chemical reactant:

This subclass is indented under subclass 54.2. Subject matter wherein cellulose or a derivative of cellulose (e.g., carboxy methyl cellulose, etc.) is chemically reacted with a previously formed solid polymer.

SEE OR SEARCH CLASS:

- 528, Synthetic Resins or Natural Rubbers, subclass 35 for the definition of cellulose or derivative.

54.22 Previously formed solid polymer is derived from N=C=X reactant or contains N=C=X group wherein X is chalcogen:

This subclass is indented under subclass 54.21. Subject matter wherein a N=C=X reactant is a precursor for the solid polymer or the solid polymer contains N=C=X groups, and wherein X is a chalcogen atom (i.e., oxygen, sulfur, selenium, or tellurium).

- (1) Note. So-called "Blocked" isocyanates are included herein since presumably free $N=C=X$ is regenerated prior to reaction.
- 54.23 Previously formed solid polymer is derived from ethylenically unsaturated reactants only:**
This subclass is indented under subclass 54.21. Subject matter wherein only ethylenically unsaturated compounds are precursors for the solid polymer.
- 54.24 Starch, starch flour or meal, or derivative as chemical reactant:**
This subclass is indented under subclass 54.2. Subject matter wherein the carbohydrate material is a starch, a starch containing flour or meal (i.e., farinaceous flour) or a derivative thereof.
- SEE OR SEARCH CLASS:
528, Synthetic Resins or Natural Rubbers, subclass subclass 47 for a definition of starch or derivative.
- 54.26 Previously formed solid polymer derived from ethylenic reactants only:**
This subclass is indented under subclass 54.24. Subject matter wherein the previously formed solid polymer is derived solely from ethylenically unsaturated reactants.
- 54.3 Previously formed solid polymer containing chemically combined carbohydrate admixed with a chemical treating or ethylenic agent, SPFI, SICP, or solid polymer:**
This subclass is indented under subclass 50. Subject matter wherein a solid polymer having chemically bound carbohydrate (or derivative) is treated by admixing with any of (a) chemical treating agent, (b) ethylenic agent, (c) solid polymer, (d) SPFI, or (e) SICP.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of "carbohydrate derivative".
526, Synthetic Resins or Natural Rubbers, subclasses 238.2+ for solid polymers prepared by polymerization of ethylenically unsaturated monomers having carbohydrate or derivative chemically bonded thereto.
- 527, Synthetic Resins or Natural Rubbers, subclasses 300+ for solid polymer prepared from carbohydrates or derivatives wherein at least one of the reactants is saturated.
- 54.31 Carbohydrates containing polymer is derived from starch, or starch containing flour or meal:**
This subclass is indented under subclass 54.3. Subject matter wherein the carbohydrate is starch, farinaceous flour or meal or a derivative thereof.
- SEE OR SEARCH CLASS:
524, Synthetic Resins or Natural Rubbers, subclass 47 for the definition of a starch or derivative or farinaceous flour or meal.
- 54.32 Carbohydrate containing polymer derived from acrylonitrile:**
This subclass is indented under subclass 54.31. Subject matter wherein the carbohydrate containing polymer is derived from acrylonitrile (e.g., a polymer of acrylonitrile modified starch, etc.).
- SEE OR SEARCH THIS CLASS, SUBCLASS:
54.31, for a polymer derived from methacrylonitrile.
- 54.4 Containing chemically combined natural resin or derivative thereof other than tall oil:**
This subclass is indented under subclass 50. Subject matter wherein there is a chemically combined natural resin or natural resin derivative.
- (1) Note. Natural resins include such materials as have customarily been employed as such in the paint, lacquer, varnish, adhesive, and ink trades. Examples of these materials are: shellac, rosin, abietic acid, etc.
- (2) Note. Rosin derivatives are materials which retain the abietyl ring structure even though hydrogenated or substituted (e.g., zinc resinate, abietyl alcohol, disproportionated rosin, colophony, dehydroabietic acid, etc.).

(3) Note. The natural resin or derivative can be present as a chemical constituent of a SP or SICP, a reactant with a SP, SICP, or SPFI system, or as an ethylenic agent.

(4) Note. Tall oil, per se, is not treated herein as a natural resin unless a substantial rosin content is specifically stated; otherwise, tall oil as a reactant is treated as an unsaturated fatty acid in the subclasses herein below.

54.41 Shellac:

This subclass is indented under subclass 54.4. Subject matter wherein the natural resin is shellac or a derivative thereof.

54.42 Previously formed solid polymer chemically reacted with natural resin or derivative:

This subclass is indented under subclass 54.4. Subject matter wherein a natural resin or a derivative or a natural resin is chemically reacted with a previously formed solid polymer.

(1) Note. The previously formed solid polymer can itself contain chemically combined natural resin or derivative.

54.44 At least one previously formed solid polymer derived from ethylenic monomers only:

This subclass is indented under subclass 54.4. Subject matter wherein at least one solid polymer is present which is derived from ethylenic monomers only.

54.45 Previously formed polymer containing chemically combined natural resin or derivative admixed with an ethylenic agent or a chemical treating agent other than SICP or SPFI:

This subclass is indented under subclass 54.4. Subject matter wherein a solid polymer derived from a natural resin or derivative is subsequently admixed with a chemical treating agent or an ethylenic agent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.4, for a chemical treating agent which is a SICP or SPFI.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, subclass 238.3 for solid polymers derived from ethylenic monomer having a natural resin chemically bonded thereto.

527, Synthetic Resins or Natural Rubbers, subclasses 600+ for solid polymers derived from natural resin or derivative.

54.5 Chemically combined coal, bituminous material, extract or derivative thereof; oil shale; or fatty still residue:

This subclass is indented under subclass 50. Subject matter wherein the resin system has chemically bound thereto coal, bituminous material or extract thereof or a fatty still residue.

(1) Note. Oil shale derivative similarly treated would be placed herein.

(2) Note. The material proper for this subclass (e.g., coal, etc.) can be present as a chemical constituent of a SP or SICP, a reactant with a SP, SICP, or SPFI system, or as an ethylenic agent (in the case of coal, etc., modified to have ethylenic groups).

SEE OR SEARCH CLASS:

524, Synthetic Resins or Natural Rubbers, for subclass 59 and 705 for a definition of chemically combined coal, bituminous material, extract or derivative thereof, oil shale, or fatty still residue.

526, Synthetic Resins or Natural Rubbers, subclass 290 for solid synthetic polymer derived from ethylenically unsaturated coal, bituminous material, extract or derivative thereof; or from unsaturated fatty still residue where all monomers present are ethylenically unsaturated.

527, Synthetic Resins or Natural Rubbers, subclass 500 for solid synthetic polymer derived from coal or bituminous material, extract thereof or fatty still residue.

55 At least one solid polymer derived from ethylenic reactants only:

This subclass is indented under subclass 50. Subject matter which involves mixing of a solid polymer derived from ethylenic reactants only with (a) a solid polymer, (b) specified polymer-forming ingredients or a specified intermediate condensation product, or (c) a chemical treating agent or an ethylenic reactant; or processes of reacting or the product formed by any of the mixing operations or any of the reacting processes.

56 Polyvinyl alcohol:

This subclass is indented under subclass 55. Subject matter involves polymeric products containing vinyl alcohol units, processes of preparing wherein the final desired product is a polymer containing vinyl alcohol units; composition of a polymer containing vinyl alcohol units and a solid polymer, specified polymer-forming ingredients, a specified intermediate condensation product, chemically reactive material, or ethylenic reactant; or processes of preparing such a composition; composition of a precursor polymer and a reactive material which, under disclosed conditions, will prepare a vinyl alcohol polymer and processes of preparing such a composition.

- (1) Note. A vinyl alcohol-containing polymer requires at least three $\text{CH}_2\text{-H}$ groups in the polymeric chain.
- (2) Note. Vinyl alcohol polymers for the most part herein are prepared by the partial hydrolysis or saponification of polymers of vinyl esters, particularly homo- or interpolymeric-vinyl acetate. Any subsequent chemical treatment to polyvinyl alcohol will be assumed to have left unreacted alcohol groups. For this reason, polymers such as polyvinyl acetal, polyvinyl butyral, etc., will be found here.
- (3) Note. Claims to a polymer admixed with a chemically reactive material or the process of preparing such a composition are classified in this area as if the actual process has gone to completion. As such, these types of claims are classified in the appropriate indented process area, rather

than on the basis of the final treated product.

SEE OR SEARCH CLASS:

- 526, Synthetic Resins or Natural Rubbers, and in particular, subclass 202 for a process of polymerizing an ethylenic monomer in the presence of a vinyl alcohol polymer wherein there is no intent to react the vinyl alcohol polymer with the polymerizable monomer or to form a composition therewith.
- 528, Synthetic Resins or Natural Rubbers, subclasses 480+ for processes involving the treatment of a vinyl alcohol polymer-containing material, without destroying the integrity of the polymer.

57 With solid polymer derived from ethylenic reactants only:

This subclass is indented under subclass 56. Subject matter wherein polyvinyl alcohol is mixed with at least one solid polymer derived from ethylenic reactants only, e.g., polymethyl methacrylate, etc.

58 With specified intermediate condensation product, specified polymer-forming ingredients, or polymer thereof:

This subclass is indented under subclass 56. Subject matter wherein polyvinyl alcohol is mixed with a specified intermediate condensation product, specified polymer-forming ingredients, or polymers thereof.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "specified intermediate condensation product" and "specified polymer-forming ingredients."

59 With ethylenic reactant:

This subclass is indented under subclass 56. Subject matter wherein polyvinyl alcohol is mixed with an ethylenic reactant (e.g., acrylic acid, acrylamide, etc.).

60 Interpolymers:

This subclass is indented under subclass 56. Subject matter drawn to polymeric products only, wherein vinyl acetate has been copolymerized with at least one coreactant and the

resultant copolymer subsequently hydrolyzed to produce (CH₂-H) units.

61 Chemical modification utilizing a chemical treating agent:

This subclass is indented under subclass 56. Subject matter drawn to processes of chemically modifying homopolymers and copolymers of vinyl alcohol using a chemical treating agent, e.g., treating polyvinyl alcohol with aldehydes to give polyacetate or with PCl₅ to substitute the hydroxyl group, with chlorine atoms, etc.

62 Processes only of preparing polyvinyl alcohol:

This subclass is indented under subclass 56. Subject matter wherein a nonvinyl alcohol unit precursor polymer is modified so as to prepare a vinyl alcohol-containing polymer therefrom.

- (1) Note. For the most part the patents herein relate to subsequent aftertreatment of polymeric vinyl carboxylates.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 61, for processes of chemically modifying a vinyl alcohol unit-containing polymer.

63 Mixing of solid graft or graft-type copolymer with other solid polymers wherein one of said solid polymers is not derived from ethylenic reactants only; mixing of said polymer mixture with a chemical treating agent; or mixing of graft or graft-type copolymer with a specified intermediate condensation product or specified polymer-forming ingredients; or processes of forming or reacting; or the resultant product or any of the above operation:

This subclass is indented under subclass 55. Subject matter which involves mixing of a solid graft or graft-type copolymer with other solid polymer(s) wherein the solid polymer, graft, or graft-type copolymer(s) is not derived exclusively from ethylenic reactants; or mixing of said polymeric mixture with a chemical treating agent; or mixing of graft or graft-type copolymer with a specified intermediate condensation product or with specified polymer-forming ingredients, or polymer thereof; or

processes of forming or the resultant product of any of the above mixtures.

- (1) Note. A nonethylenically polymerized solid graft, solid graft-type or nongraft polymer is one which was obtained as a solid other than from ethylenic polymerization exclusively. This would include, for example, such polymers as ethylene-carbon monoxide copolymer, ethylene-ethylene oxide block copolymer, caprolactam-styrene graft copolymer and the typical poly condensation polymers (e.g., polyesters, polyamines and polyurethanes, etc.).

- (2) Note. The product derived from the reaction of a solid polymer substrate from ethylenic reactants only and a nonethylenic reactant to form a graft or graft-type copolymer is not considered as being of the type derived from ethylenic reactants only. Similarly, the product obtained from graft copolymerizing an ethylenic reactant onto a solid polymer not derived exclusively from ethylenic reactants is also not considered as being a graft or graft-type copolymer derived from ethylenic reactants only. For purposes of classification a polymer is classified as: (A) A graft copolymer when

- (1) The structure is given, i.e., to a long solid polymer backbone (substrate) is attached a pendant (nonterminal) polymer or copolymer superstrate with at least three reactant units in length or,

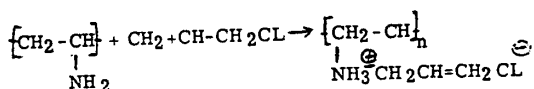
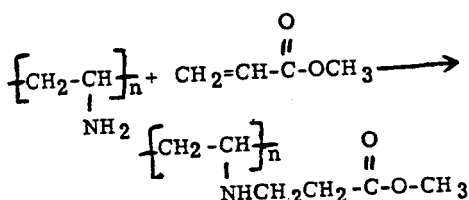
- (2) the copolymer is so named as a graft providing that the disclosure is otherwise silent as to the structure or, if structure is likewise recited, it is consistent with that required in A.1 above or,

- (3) the structure can be ascertained from the following limiting process conditions: (a) The disclosure states there is a reaction between a solid polymerized unsaturated reactant and an unpolymerized unsaturated reactant in the presence of a catalyst or, (b) the disclosure does not state whether or not any reaction has occurred between the solid polymerized unsaturated reactant and the unpolymer-

ized unsaturated reactant, but relates that a product is obtained which is inseparable by a variety of physical techniques such as, extraction, precipitation, ion exchange, etc. In the absence of one or more of these requirements the reaction is considered to produce a polymeric blend.

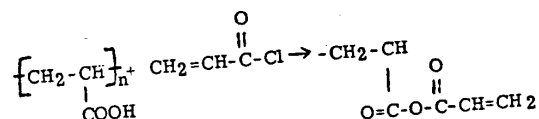
(B) A graft-type copolymer when

(1) The structure is given, i.e., to a long solid polymer backbone (substrate) possessing nonterminal active sites or functional groups is attached (grafted) through a chemical reaction with these functional groups or sites an ethylenic reactant containing one or more functional groups or active sites. The reaction product may or may not possess unsaturated pendant groups depending on the mode of chemical reaction. The following examples will illustrate this point



(2) The structure can be ascertained when:

(a) There is disclosed a reaction between the solid polymerized unsaturated reactant and the unpolymerized unsaturated reactant which reaction uses specific art-recognized terms (e.g., esterification, acylation, sulfonylation, cyanoethylection, addition to, reaction or condensation with, halogenation, nitration, sulfonation, alkylation, amination, etc.). An example of these reactions would be:



(b) There is disclosed an interaction between two or more solid polymers through their respective nonterminal functional groups or through the use of an intermediate reactant or chemical agent (e.g., causing salt, ester, amide, urea formation). Examples of these reactions would be: (1) Contacting polypropylene and polyethylene with benzoyl peroxide (2) Contacting polyvinylamine and polyallylamine with glyoxal (3) Contacting chloromethylated polystyrene with polyvinylamine (4) Contacting polyacrylic acid with polyvinylamine. In the absence of one or more of these requirements the reaction is considered to produce a polymeric blend.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the terms "specified intermediate condensation product" and "specified polymer-forming ingredients".

64 Solid graft or graft-type copolymer derived from ethylenic reactants only:

This subclass is indented under subclass 63. Subject matter wherein the solid graft or graft-type copolymer was derived from a solid polymer derived from only ethylenically unsaturated reactants which was subsequently reacted with ethylenic reactants, e.g., styrene and acrylonitrile graft-copolymerized onto poly (butadiene-styrene), etc.

- (1) Note. The preparation of a graft copolymer from all or some of its constituents in the presence of a solid polymer derived from ethylenic reactants only would be classified elsewhere.
- (2) Note. This subclass provides for all graft or graft-type copolymers wherein a solid polymer from ethylenic reactants only is treated with polymer-forming ingredi-

ents in any sequence. For instance, this subclass would provide for a graft or graft-type copolymer prepared by treating a solid polymer from ethylenic reactants only with ethylene glycol followed by reacting with maleic anhydride; or wherein the polymer is first reacted with maleic anhydride followed by reaction with ethylene glycol. This subclass also provides for graft or graft-type copolymers which are prepared by treating a solid polymer from ethylenic reactants only concurrently with ethylene glycol and maleic anhydride.

SEE OR SEARCH THIS CLASS, SUBCLASS:

193, for the process of grafting styrene and acrylonitrile onto polybutadiene in the presence of polyetherylene.

- 65 With saturated 1,2-epoxy reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom; or with solid copolymer derived from at least one unsaturated 1,2-epoxy reactant wherein the epoxy reactant contains more than one 1,2-epoxy group per mole and at least one saturated reactant:**

This subclass is indented under subclass 64. Subject matter wherein, in addition to the solid graft or graft-type copolymer derived from ethylenic reactants only, there is also present (a) a saturated polyepoxide reactant or polymer thereof, or (b) a solid polymer derived from at least one saturated reactant and at least one unsaturated 1,2-epoxy reactant, e.g., a mixture of butadiene-styrene-acrylonitrile graft copolymer with trioxaneglycol diglycidyl ether copolymer, etc.

- (1) Note. A saturated polyepoxide is by definition a specified polymer-forming ingredient; and see Class 520 Glossary for the definition of other terms noted as specified polymer-forming ingredients.

- 66 With solid polymer derived from at least one nitrogen-containing reactant wherein at least one of the reactants forming the solid polymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients contains a nitrogen atom or with a reaction product**

thereof; or with nitrogen-containing specified intermediate condensation product:

This subclass is indented under subclass 64. Subject matter wherein, in addition to the solid graft or graft-type copolymer derived from ethylenic reactants only, there is also present (a) a reactant or a solid copolymer derived from a nitrogen-containing reactant and wherein at least one of the reactants forming the solid copolymer is saturated, or (b) specified polymer-forming ingredients wherein at least one of the necessary polymer-forming ingredients contains a nitrogen atom and at least one of the necessary polymer-forming ingredients is saturated or a reaction product or condensate thereof, e.g., a mixture of butadiene-styrene-acrylonitrile graft copolymer admixed with nylon 6, etc.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the term "specified polymer-forming ingredients".

- 67 With solid polymer derived from at least one halhal, -OO- or halO- reactant wherein at least one of the reactants forming the solid polymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients is a halhal, -OO-, or halO- containing reactant or reaction product thereof; or with a specified intermediate condensation product containing a hal or -OO- group:**

This subclass is indented under subclass 64. Subject matter wherein, in addition to the solid graft or graft-type, copolymer derived from ethylenic reactants only, there is also present (a) a solid polymer derived from a saturated halhal, -OO-, or halO- reactant or a solid copolymer derived from a halhal, -OO-, or halO-containing reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (b) specified polymer-forming ingredients wherein at least one of the necessary polymer-forming ingredients contains a halhal, -OO-, or halO- group and at least one of the necessary polymer-forming ingredients is saturated or a reaction product thereof.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the term “specified polymer-forming ingredients”.

- 68 With solid polymer derived from at least one phenolic reactant wherein at least one of the reactants forming the solid polymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients is a phenolic reactant or with a reaction product thereof; or with phenolic-containing specified intermediate condensation product:**

This subclass is indented under subclass 64. Subject matter wherein, in addition to the solid graft or graft-type copolymer derived from ethylenic reactants only, there is also present (a) a solid polymer derived from a saturated phenolic reactant or a solid copolymer derived from a phenolic-containing reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (b) specified polymer-forming ingredients wherein at least one of the necessary polymer-forming ingredients contains a phenolic group and at least one of the necessary polymer-forming ingredients is saturated or a reaction product thereof.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, for the definition of the term “specified polymer-forming ingredients”.

- 69 Solid graft of graft-type copolymer contains backbone derived from ethylenic reactants only:**

This subclass is indented under subclass 63. Subject matter wherein the graft copolymer substrate is derived from ethylenically unsaturated reactants only, e.g., epsilon-caprolactone graft polymerized onto styrene-2-hydroxyethyl methacrylate copolymer, etc.

- 70 Mixing of solid graft or graft-type copolymer derived from ethylenic reactants only with other solid polymer derived from ethylenic reactants only; or treating said mixture with chemical treating agent; or processes of**

forming or reacting; or the resultant product of any of the above operations:

This subclass is indented under subclass 55. Subject matter which involves the mixing of a solid graft-type copolymer derived from ethylenic reactants only with other solid polymers derived from ethylenic reactants only; or treating said polymer mixture with a chemical treating agent; or process of forming or reacting; or the resultant product of any of the above mixtures.

- (1) Note. This subclass does not include those reactions which involve the preparation of a graft or graft-type copolymer in the presence of another solid ethylenic polymer.
- (2) Note. This subclass provides for the mixing of two or more solid polymers at least one of which is a graft-type copolymer and both being derived from ethylenic reactants only. This subclass does not exclude the aftertreatments of ethylenic polymers or graft or graft-type copolymers with nonethylenic materials. However, classification in this area is based only on ethylenic materials (e.g., halogenated polybutadiene grafted with maleic anhydride). For purposes of classification in this area, only polybutadiene and maleic anhydride are to be considered in making the graft copolymer and not the halogenated polybutadiene.
- (3) Note. “Solid polymer” as used in this subclass is generic and includes a non-graft polymer as well as a graft or graft-type polymer all of which were produced only from ethylenic reactants.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 63, for definitions of the terms “graft copolymer and graft-type copolymers”.
- 193, for a final product mixture of polyvinylchloride and polybutadiene grafted to polystyrene-acrylonitrile, obtained by aftertreating a mixture of polyvinyl chloride and polybutadiene with styrene and acrylonitrile.

- 313, for the same product when obtained from a mixture of polyvinyl chloride and butadiene, styrene, and acrylonitrile.
- 71 Contains two or more graft or graft-type copolymers or a graft or a graft-type copolymer and at least one block or block-type copolymer:**
This subclass is indented under subclass 70. Subject matter wherein the mixture contains two or more graft or graft-type copolymers (or mixture thereof), a graft or graft-type copolymer, and at least one block or block-type copolymer.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
88, for the definition of a "block or block-type copolymer".
- 72 Mixture contains solid polymer derived from reactants containing an atom other than C, H, O, N, or chlorine:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing an element other than carbon, hydrogen, oxygen, nitrogen, and chlorine.
- 73 Mixture contains solid polymer derived from reactant containing nitrogen heterocycle:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing a nitrogen heterocycle (e.g., 2-methyl-5-vinylpyridine, n-vinyl pyrrolidone, etc.).
- 74 Mixture contains solid polymer derived from reactant containing oxygen heterocycle:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing an oxygen heterocycle (e.g., maleic anhydride, glycidyl acrylate, etc.).
- 75 Mixture contains solid polymer derived from reactant containing a fused- or bridged-ring system or from cycloaliphatic reactant:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant which contains a fused- or bridged-ring system, or a cycloaliphatic system (e.g., dicyclopentadiene, etc.).
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fused or bridged ring system".
- 76 Mixture contains solid polymer derived from chlorine-containing reactant other than from vinyl(idene) chloride:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing halogen other than vinyl chloride or vinylidene chloride (e.g., 1-chloroacrylonitrile, etc.).
- 77 Mixture contains solid polymer derived from reactant containing nitrogen other than from (meth)acrylonitrile:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing nitrogen other than from (meth)acrylonitrile (e.g., acrylamide, etc.).
- 78 Mixture contains solid polymer derived from reactant containing carboxylic acid group:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing a carboxylic acid group (e.g., acrylic acid, etc.).
- 79 Mixture contains solid polymer derived from reactant containing ether or hydroxyl group:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing an ether or hydroxyl group (e.g., vinyl ether, etc.).

- 80 Mixture contains solid polymer derived from reactant containing carboxylic acid ester group:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with an ethylenic reactant containing a carboxylic acid ester group (e.g., methyl methacrylate, vinyl acetate, etc.).
- 81 Reactant contains at least two ester groups:**
This subclass is indented under subclass 80. Subject matter wherein the ethylenic reactant contains two ester groups (e.g., diallyl phthalate, etc.).
- 82 Ester derived from a polyol:**
This subclass is indented under subclass 81. Subject matter wherein the ethylenic carboxylic acid reactant ester is derived from a polyol (e.g., ethylene glycol diacrylate, etc.).
- 83 Substrate polymer derived from hydrocarbon containing plural unsaturation:**
This subclass is indented under subclass 80. Subject matter wherein the graft or graft-type copolymer's substrate is derived from a hydrocarbon reactant containing plural unsaturation (e.g., butadiene, etc.).
- 84 Polymer substrate derived from hydrocarbon reactants only:**
This subclass is indented under subclass 83. Subject matter wherein the graft or graft-type copolymer's substrate is derived only from ethylenic hydrocarbon reactants one of which must be plural unsaturated (e.g., butadiene, etc.).
- 85 Polymer substrate derived from an unsaturated carboxylic acid ester:**
This subclass is indented under subclass 80. Subject matter wherein the graft or graft-type copolymer's substrate is a polymer derived from an ethylenically unsaturated carboxylic acid ester (e.g., methyl methacrylate, etc.).
- 86 Mixture contains solid polymer derived from nonaromatic reactant containing plural ethylenically unsaturated groups:**
This subclass is indented under subclass 70. Subject matter wherein a solid polymer is derived from or has been reacted with a plural unsaturated reactant which does not contain an aryl group (e.g., butadiene, etc.).
- 87 Solid polymer other than graft or graft-type derived from nonaromatic plural ethylenically unsaturated reactant:**
This subclass is indented under subclass 86. Subject matter wherein the mixture contains, in addition to the graft copolymer or graft-type copolymer, a nongrafted solid polymer derived from a plural ethylenically unsaturated reactant which is devoid of any aryl group (e.g., butadiene, etc.).
- 88 Mixing of solid block or block-type copolymer with other solid polymer; mixing of said polymer mixture with a chemical treating agent; mixing of a block or block-type copolymer with specified intermediate condensation product or with specified polymer-forming ingredients; or processes of forming or reacting; or the resultant product of any of the above operations:**
This subclass is indented under subclass 55. Subject matter which involves the mixing of a solid block or block-type copolymers with other solid polymer(s); mixing of said polymer mixture with a chemical treating agent; mixing of block or block-type copolymer with a specified intermediate condensation product or with specified polymer-forming ingredients or their polymers; or processes of mixing or forming; or the resultant product of any of the above mixtures.
- (1) Note. For purposes of classification a polymer is classified as:
- (A) A block copolymer when
1. The structure is given, i.e., to a long polymer backbone is attached or coupled to one or both of its terminal ends one or more chemically dissimilar polymers at least three reactant units in length or,
 2. the copolymer is named as a block providing that the disclosure is otherwise silent as to its structure or, if the structure is likewise given, it is consistent with that described above or,

3. the structure can be ascertained from the following limiting process conditions:

(a) Treating a nonterminated solid polymer, that is, one which is terminally active or “living”, with an ethylenic reactant with subsequent polymerization to form additional blocks. The process may be continued to produce higher order block copolymers. For example, treating dilithiated polystyrene with butadiene to yield an ABA block copolymer.

(b) Two or more chemically dissimilar nonidentical solid polymer chain ends are coupled directly or through the use of a chemical agent. For example, the coupling of hydroxy-terminated solid polybutadiene with hydroxy terminated polyethylene glycol terephthalate using phosgene.

(B) A block-type copolymer when

1. The structure is given, i.e., to a long solid polymer backbone possessing terminally active sites, e.g., contains functional groups or is a “living polymer”, etc., is attached or coupled through chemical reaction with those functional groups or sites an ethylenic reactant containing one or more functional groups or sites, for example, contacting hydroxy terminated polybutadiene with allyl isocyanate or,

2. two or more identical solid polymer chain ends are coupled directly or through the use of a chemical agent. For purposes here, identical means those polymer segments which contain the same backbone but differ (e.g., in stereoregularity, isotacticity syndiotacticity, atacticity, optical activity, or degree of polymerization). Thus, coupling lithium terminated polystyrene segments with molecular weights of 25,000 and 100,000 respectively with stannic chloride is proper for this subclass.

Failure to meet one or more of these requirements, the reaction is considered to produce a polymeric blend. For example, contacting lithium terminated polystyrene with ethylene oxide followed by blending with polyacrylic acid places the product blend in subclass 221.

- (2) Note. Patents which describe the after-treatment of solid polymer from ethylenic reactants only with a nonethylenic agent are classified according to the reactants first leading to formation of the solid polymer. However, if the after-treating agent is an ethylenic reactant, it is given equal weight with these reactants used in making the solid polymer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

191+, for a product wherein the same solid polymer from ethylenic reactants only is coupled utilizing a coupling agent and subsequently blended with a different solid polymer derived from ethylenic reactants only.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definitions of the terms “specified intermediate condensation product” and “specified polymer-forming ingredients”.

89 **Mixture contains two or more solid block or block-type copolymers:**

This subclass is indented under subclass 88. Subject matter wherein the mixture contains at least two solid block copolymers or block-type copolymers.

- (1) Note. There must be at least one solid polymer derived from ethylenically unsaturated reactants only. However, the required solid polymer from ethylenic reactants only need not be in block- or block-type form. An example of the mixture required for this subclass could consist of solid polyethylene and ethylene oxidebutyrolactone block copolymer. Unless stated to the contrary, in the absence of any disclosure, the polymer block shall be assumed to be a solid

when derived from ethylenic reactants only and a liquid when derived other than only from ethylenic reactants.

- 90 Mixture contains solid block copolymer wherein at least one block is derived from ethylenic reactants only and at least one block is derived from at least one saturated reactant:**

This subclass is indented under subclass 88. Subject matter wherein the block copolymer contains at least one block ethylenic reactants only and at least one block from at least one saturated reactant, e.g., dimethylsiloxane-styrene block copolymer, etc.

- 91 Block derived from at least one saturated reactant containing a heterocycle:**

This subclass is indented under subclass 90. Subject matter wherein block polymer from at least one saturated reactant is derived from a heterocyclic reactant, e.g., butadiene-butyrolactone block copolymer, etc.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "heterocyclic".

- 92 Mixture contains solid polymer derived from at least one saturated reactant, specified intermediate condensation product, or specified polymer-forming ingredients:**

This subclass is indented under subclass 88. Subject matter wherein the mixture contains a solid polymer from ethylenic reactants only, specified intermediate condensation product, specified polymer-forming ingredients or polymers thereof (e.g., polycarbonate from bisphenol A and phosgene, etc.).

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the terms "specified intermediate condensation product" and "specified polymer-forming ingredients".

- 93 Mixture contains solid polymer derived from reactant containing chalcogen:**

This subclass is indented under subclass 88. Subject matter wherein the solid polymer is derived from or has been reacted with an ethyl-

enic reactant containing a chalcogen atom (O, S, Se, and Te) (e.g., acrylic acid, etc.)

- (1) Note. In this subclass and its indent(s), "solid polymer" is generic and is meant to include an ethylenic block, block-type, or nonblock polymer.

- 94 Solid block or block-type copolymer derived from reactant containing carboxylic acid ester group:**

This subclass is indented under subclass 93. Subject matter wherein the solid block or block-type copolymer contains a polymer block derived from a reactant containing a carboxylic acid ester group, e.g., methyl acrylate, etc.

- (1) Note. In this subclass and its indent(s), "solid polymer" is generic and is meant to include an ethylenic block, block-type, or nonblock polymer.

- 95 Mixture contains solid block or block-type copolymer derived from ethylenically unsaturated hydrocarbon reactants only at least one of which contains at least four carbon atoms:**

This subclass is indented under subclass 88. Subject matter wherein the solid block or block-type copolymer is derived from ethylenic hydrocarbon reactants only and at least one of the hydrocarbon reactants contains at least four carbon atoms, e.g., a mixture of polyethylene with block (polyethylene-polybutene-1), etc.

- (1) Note. In this subclass and its indent(s), "solid polymer" is generic and is meant to include an ethylenic block, block-type, or nonblock polymer.

- 96 With solid polymer derived from reactant containing an atom other than C or H:**

This subclass is indented under subclass 95. Subject matter wherein, in addition to the solid block or block-type copolymer, there is at least one solid polymer derived from a reactant containing elements other than carbon and hydrogen, e.g., a mixture of poly(styrene-acrylonitrile) with block (polybutadiene-polystyrene), etc.

97 Mixture contains solid polymer derived from reactant containing a fused- or bridged-ring system:

This subclass is indented under subclass 95. Subject matter wherein the mixture contains a solid polymer derived from a reactant which contains a fused- or bridged-ring system, e.g., a mixture of block (polyethylene-polypropylene) with poly(butadiene-ethylidene-norbornene), etc.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the term "fused or bridged ring system".

98 Solid block or block-type copolymer derived reactant containing plural unsaturation:

This subclass is indented under subclass 95. Subject matter wherein the block or block-type copolymer is derived from a plural ethylenically unsaturated reactant, e.g., a mixture of polystyrene with block (polybutadiene-polystyrene), etc.

99 With solid polymer derived from reactant containing plural unsaturation:

This subclass is indented under subclass 98. Subject matter wherein, in addition to the solid block or block-type copolymer, there is present a solid polymer derived from a plural ethylenically unsaturated reactant, e.g., block (polybutadiene-polystyrene) with poly(butadiene-butene-1), etc.

100 With saturated Si-C or Si-H reactant or polymer thereof; or with solid copolymer derived from at least one Si-C or Si-H reactant wherein at least one of the reactants forming the solid copolymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients contains a Si-C or Si-H bond or with a reaction product thereof; or with a specified intermediate condensation product containing a Si-H or Si-C bond:

This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a saturated reactant containing a Si-C or Si-H bond or a polymer thereof, or (b) a solid copolymer

derived from a Si-C or Si-H-containing reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (c) specified polymer-forming ingredients wherein at least one of the necessary polymer-forming ingredients contains an Si-C or Si-H bond and at least one of the necessary polymer forming ingredients is saturated or a reaction product thereof, or (d) a specified intermediate condensation product containing an Si-C or Si-H bond.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "specified intermediate condensation product" and "specified polymer-forming ingredients".

101 Contacting with nonsilicon-containing specified intermediate condensation product, nonsilicon-containing specified polymer-forming ingredient, or polymer thereof; or with two or more solid polymers:

This subclass is indented under subclass 100. Subject matter wherein the solid polymer from ethylenic reactants only is contacted with a nonsilicon specified intermediate condensation product or nonsilicon polymer-forming ingredients or their polymers thereof; or is contacted with two or more solid polymers.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "specified intermediate condensation product" or "specified polymer-forming ingredients".

102 Si-H or Si-C reactant contains an atom other than C, H, O, or Si bonded to a carbon atom:

This subclass is indented under subclass 100. Subject matter wherein the Si-H or Si-C bond-containing reactant or polymer thereof contains an atom other than C, H, or O bonded to carbon e.g., 3,3,3-trifluoromethyl propyl siloxane, etc.

- (1) Note. Elements that are other than C, H, or O and are incorporated into the polymer by non Si-H a Si-C containing reactants are not considered for this subclass. The elements required must be part of a Si-H or Si-C reactant.

- 103 Solid polymer from ethylenic reactants only is derived from heterocyclic reactant:**
This subclass is indented under subclass 100. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenically unsaturated heterocyclic reactant, e.g., N-Vinyl pyrrolidine, etc.
- 104 Solid polymer from ethylenic reactants only is derived from reactant containing halogen atom:**
This subclass is indented under subclass 100. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenic reactant containing a halogen atom (e.g., tetrafluoroethylene, etc.).
- 105 Solid polymer from ethylenic reactants only is derived from plural unsaturated hydrocarbon:**
This subclass is indented under subclass 100. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenic reactant which is a plural unsaturated hydrocarbon.
- 106 Solid polymer from ethylenic reactants only is derived from unsaturated hydrocarbon:**
This subclass is indented under subclass 100. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenic hydrocarbon (e.g., styrene, etc.).
- 107 With saturated 1, 2-epoxy reactant containing more than one 1, 2-epoxy group per mole or polymer derived therefrom; or with solid copolymer derived from at least one saturated reactant and at least one unsaturated 1, 2-epoxy reactant wherein the epoxy reactant contains more than one 1, 2-epoxy group per mole:**
This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a reactant containing more than 1, 2-epoxy group or polymer thereof, or (b) a solid copolymer derived from at least one saturated reactant and an unsaturated reactant containing more than one 1, 2-epoxy groups per mole
- (1) Note. The 1, 2-epoxy reactant may be an epoxidized solid polymer.
- 108 Contacting two or more solid polymers derived from ethylenic reactants only with a poly 1, 2-epoxy-containing reactant; or contacting a solid polymer derived from ethylenic reactants only with a poly 1, 2-epoxy-containing reactant and subsequently contacting with an additional polymer derived from ethylenic reactants only:**
This subclass is indented under subclass 107. Subject matter wherein two or more solid polymers derived from ethylenic reactants only are contacted with a reactant containing more than one 1, 2-epoxy group per mole, or polymer containing more than one epoxy group per mole; or contacting a solid polymer derived from ethylenic reactants only with said 1, 2-epoxy compound and subsequently contacting with an additional solid polymer derived from ethylenic reactants only.
- 109 With phenolic reactant or polymer thereof and is free of 1, 2-epoxy groups:**
This subclass is indented under subclass 107. Subject matter wherein there is an additional reactant present which is a phenolic material or polymer therefor and which material or polymer is free of any 1, 2-epoxy group (e.g., polyvinyl chloride mixed with a phenol-formaldehyde resin and the diglycidyl ether of bisphenol A, etc.).
- 110 With reactant which is an aldehyde, aldehyde derivative, or polymer thereof, and which is free of an 1, 2-epoxy group (included herein are alkylated methylol groups):**
This subclass is indented under subclass 107. Subject matter wherein there is an additional reactant present which is an aldehyde or aldehyde derivative, or polymer thereof, and which reactant is free of any 1, 2-epoxy groups.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "aldehyde derivative".
- 111** This subclass is indented under subclass 107. With reactant which is free of an 1, 2-epoxy group and which contains a -N=C=X group or

polymer thereof (X is chalcogen); or with a polyol and a polycarboxylic acid or reaction product thereof which is free of an 1, 2-epoxy groups: Subject matter wherein there is an additional reactant present which is free of any 1, 2-epoxy group and which contains more than one -N=C=X (X is chalcogen) group or polymer thereof; or with a polyol and a polycarboxylic acid or derivative or with a reaction product thereof and which reactants or polymer are free of any 1, 2-epoxy groups, e.g., polyurethanes, polyesters, etc.

111.5 With a reactant which is a fatty acid glycerol ester, a fatty acid or salt derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil:

This subclass is indented under subclass 107. Subject matter wherein there is, in addition, at least one reactant which is a fatty acid glycerol ester, or a fatty acid or salt thereof derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil.

- (1) Note. The contacting of the polymer with the fatty acid material can be prior, concurrent, or subsequent to contacting with the poly 1, 2-epoxide material.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fatty acid" and of other materials proper for this subclass.

112 Contacting polymer from ethylenic reactants only with ethylenic reactant wherein said contacting is either concurrent with or subsequent to the contacting with the saturated poly 1, 2-epoxy reactant:

This subclass is indented under subclass 107. Subject matter wherein a solid polymer from ethylenic reactants only is contacted with an ethylenic reactant and said contacting is either concurrent with or subsequent to the contacting of the solid polymer from ethylenic reactants only with a saturated reactant containing more than one 1, 2-epoxy group per mole.

SEE OR SEARCH THIS CLASS, SUBCLASS:

107+, for contacting of a solid polymer from ethylenic reactants only with an ethylenic reactant only followed by con-

tacting with a reactant containing more than 1, 2-epoxy group per mole.

113 With nitrogen-containing reactant, or wherein the poly 1, 2-epoxy reactant contains a nitrogen atom:

This subclass is indented under subclass 107. Subject matter wherein there is, in addition, a nitrogen-containing reactant which can be added at any time to the solid polymer from ethylenic reactants only; or wherein the reactant which contains more than one 1, 2-epoxy group per mole contains nitrogen, e.g., a mixture of poly (styrene-acrylic acid), poly (epichlorohydrin-bisphenol A) and ethylene diamine.

114 With additional heterocyclic reactant free of 1, 2-epoxy group:

This subclass is indented under subclass 107. Subject matter wherein there is, in addition, a non-1, 2-epoxy heterocyclic reactant which can be added at any time to the solid polymer from ethylenic reactants only (e.g., phthalic anhydride, etc.)

115 Poly 1, 2-epoxy reactant contains an atom other than C, H, or O:

This subclass is indented under subclass 107. Subject matter wherein the reactant which contains more than one 1, 2-epoxy group per mole contains an element other than C, H, or O.

116 Polymer derived from ethylenic reactants only derived from reactant containing an atom other than C, H, N, O, or halogen:

This subclass is indented under subclass 107. Subject matter wherein has been derived solid polymer from ethylenic reactants only or reacted with an ethylenic reactant which contains an element other than C, H, O, N, or halogen.

117 Polymer derived from ethylenic reactants only derived from heterocyclic reactant:

This subclass is indented under subclass 107. Subject matter wherein the solid ethylenic polymer is derived from or has been reacted with an ethylenic reactant containing a heterocyclic ring.

- 118 Polymer derived from ethylenic reactants only derived from reactant containing an alcohol or ether group (includes phenols):**
This subclass is indented under subclass 107. Subject matter wherein the solid ethylenic polymer is derived from or has been reacted with an ethylenic reactant containing a hydroxyl group (includes aryl type).
- 119 Polymer derived from ethylenic reactants only derived from reactant containing a -COOH group:**
This subclass is indented under subclass 107. Subject matter wherein solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenic reactant containing a carboxylic acid group.
- 120 Polymer derived from ethylenic reactants only derived from nonaromatic monoolefin:**
This subclass is indented under subclass 107. Subject matter wherein the mixture contains a solid polymerized ethylenic reactant which is a nonaromatic monoolefin (e.g., ethylene, propylene, or butene-1).
- 121 Polymer derived from ethylenic reactants only derived from reactant containing a halogen atom:**
This subclass is indented under subclass 107. Subject matter wherein the solid polymer has been derived from or has been reacted with an ethylenic reactant containing a halogen atom.
- 122 Polymer derived from ethylenic reactants only derived from unsaturated hydrocarbon:**
This subclass is indented under subclass 107. Subject matter wherein the solid polymer has been derived from or has been reacted with an ethylenic hydrocarbon.
- 123 With saturated -N=C=X (X is chalcogen) reactant or polymer thereof; or with solid copolymer derived from at least one -N=C=X reactant wherein at least one of the reactants forming the solid copolymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients contains a -N=C=X group or with a reaction product thereof; or with specified intermediate condensation product containing a -N=C=X group:**
This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a saturated -N=C=X (X is chalcogen) reactant or a polymer thereof, or (b) a solid copolymer derived from a -N=C=X-containing reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (c) specified polymer-forming ingredients wherein at least one of the necessary ingredients contains a -N=C=X group and at least one of the necessary polymer-forming ingredients is saturated or a reaction product or condensate thereof, or (d) a specified intermediate condensation product which contains a -N=C=X group.
- (1) Note. Included here under isocyanates are blocked isocyanates. See, in particular, under subclass 124.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a discussion of the terms "specified polymer-forming ingredients" and "specified intermediate condensation product".
- 124 Blocked isocyanate reactant:**
This subclass is indented under subclass 123. Subject matter wherein the -N=C=X containing reactant is blocked.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, Glossary for a definition of the term "blocked".
- 125 Contacting two or more solid polymers derived from ethylenic reactants only with a -N=C=X Reactant or polymer thereof; or contacting a polymer derived from an ethylenic reactant only with a -N=C=X reactant or polymer thereof and subsequently adding thereto a solid polymer derived only from ethylenic reactants:**
This subclass is indented under subclass 123. Subject matter wherein two or more solid polymers derived from ethylenic reactants only are contacted with a -N=C=X-containing reactant or polymer derived therefrom; or contacting a solid polymer derived from ethylenic reactant

- only with a -N=C=X -containing reactant or polymers therefrom and subsequently contacting with an additional solid polymer from ethylenic reactants only.
- 126 Contacting solid polymer from ethylenic reactants only with ethylenic reactant wherein said contacting is either concurrent with or subsequent to contacting of said solid polymer with the -N=C=X reactant or polymer thereof:**
This subclass is indented under subclass 123. Subject matter wherein a solid polymer from ethylenic reactants only is contacted with an ethylenic which is devoid of any -N=C=X group and wherein said contacting is either concurrent with or subsequent to the contacting of the solid polymer with the -N=C=X containing reactant; or wherein the solid polymerized ethylenic reactant is contacted simultaneously with an unsaturated -N=C=X -containing reactant and with a saturated coreactant and wherein the -N=C=X reactant and the saturated coreactant are necessary ingredients of a specified polymer-forming ingredient system.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
123+, for contacting a polymer from ethylenic reactant only followed by contact with a -N=C=X reactant.
- 127 Contacting with a -N=C=X containing reactant which has been previously with an organic compound containing a hydroxyl, amine, or O- group:**
This subclass is indented under subclass 123. Subject matter wherein the solid polymer from ethylenic reactants only is contacted with a -N=C=X -containing reactant which -N=C=X reactant has been previously reacted with an organic reactant containing a hydroxyl, amine, or O- group (X is chalcogen).
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "amine".
- 128 -N=C=X reactant has been previously reacted with an organic amine:**
This subclass is indented under subclass 127. Subject matter wherein the -N=C=X -containing reactant has been previously reacted with an organic amine.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of an "amine".
- 129 Solid polymer from ethylenic reactants only derived from halogen-containing reactant:**
This subclass is indented under subclass 127. Subject matter wherein the solid polymer has been derived from or reacted with an ethylenic reactant containing a halogen atom.
- 130 Solid polymer from ethylenic reactants only derived from hydrocarbon reactant:**
This subclass is indented under subclass 127. Subject matter wherein the solid polymer has been derived from or reacted with an ethylenic hydrocarbon.
- 131 Contacting with -N=C=X -containing reactant and with additional organic reactant containing a hydroxyl or amine group:**
This subclass is indented under subclass 123. Subject matter wherein the solid polymer from ethylenic reactants only is contacted both with a -N=C=X -containing reactant and a OH or organic amine-containing reactant.
- (1) Note. The contacting with the two necessary reactants can be concurrent or in any other manner.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
123, for a process involving contacting a solid polymer from ethylenic reactants only with a solid polymer which is the reaction product of a -N=C=X -containing reactant and a OH or -NH -containing reactant.
- 132 With saturated phenolic reactant or polymer thereof; or with solid copolymer derived from at least one phenolic reactant wherein at least one of the reactants forming the solid copolymer is saturated; or with**

specified polymer-forming ingredients wherein at least one of the necessary ingredients is a phenolic reactant or with a reaction product thereof; or with a specified intermediate condensation product containing a phenolic group:

This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a saturated phenolic reactant or a polymer thereof, or (b) a solid copolymer derived from a phenolic-containing reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (c) specified polymer-forming ingredients wherein at least one of the necessary ingredients contains a phenolic group and at least one of the necessary ingredients is saturated or a reaction product or condensate thereof, or (d) a specified intermediate condensation product containing a phenolic group.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "specified polymer-forming ingredients", "specified intermediate condensation product", and "phenolic reactant"
- 528, Synthetic Resins or Natural Rubbers, subclass 86 for a further discussion of phenols.

133 Contacting two or more solid polymers with a phenolic reactant; or contacting a solid polymer with a phenolic reactant and subsequently contacting the treated polymer with an additional solid polymer:

This subclass is indented under subclass 132. Subject matter wherein either a solid ethylenically polymerized polymer is (a) contacted with one other solid polymer and a phenolic reactant, or (b) is contacted first with a phenolic reactant and subsequently with one other solid polymer.

- (1) Note. The other solid polymer may be one derived other than only from ethylenic reactants (e.g., polyester, polyamide, etc.).

133.5 With a reactant which is a fatty acid glycerol ester, a fatty acid or salt derived from a nat-

urally occurring glyceride, tall oil, or a fatty acid derived from tall oil:

This subclass is indented under subclass 132. Subject matter wherein there is, in addition, at least one reactant which is a fatty acid glycerol ester, or a fatty acid or salt thereof derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of "fatty acid" and the materials proper for this subclass.

134 Contacting additionally with aldehyde or aldehyde-type reactant or polymer therefrom:

This subclass is indented under subclass 132. Subject matter wherein the solid polymer from ethylenic reactants only is contacted, in addition, with an aldehyde or aldehyde-type reactant or polymer thereof.

SEE OR SEARCH CLASS:

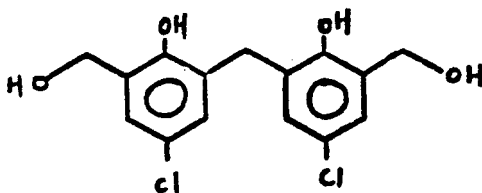
- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "aldehyde-type".

135 At least two distinct phenols, phenol ethers, inorganic phenolates, or mixtures thereof prior to reaction with aldehyde or aldehyde-type reactant:

This subclass is indented under subclass 132. Subject matter wherein the solid polymer from ethylenic reactants only is contacted with an aldehyde or aldehyde-type reactant or polymer thereof.

136 Phenolic reactant prior to contact with aldehyde or aldehyde-type reactant contains an atom other than C, H, or O:

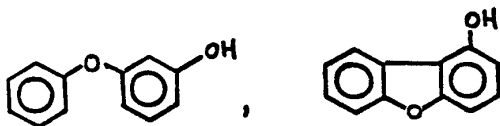
This subclass is indented under subclass 134. Subject matter wherein there is present prior to contacting with the aldehyde or aldehyde-type a phenolic reactant containing an element other than C, H, or O, e.g., 2,2'-methylenebis (4 - chloro-6-methylolphenol),



137 Phenolic reactant prior to contact with aldehyde or aldehyde-type reactant contains at least two aryl rings each of which contains phenolic substituents:

This subclass is indented under subclass 134. Subject matter wherein there is present prior to contact with the aldehyde or aldehyde-type phenolic reactant containing at least two aryl rings each of which contains a phenolic OH group.

- (1) Note. The rings may be fused as in 1, 8-dihydroxy naphthalene or as in bisphenol A. Diphenyl ether is not considered as having two phenolic moieties. However, the following two compounds identified below would be considered as having two phenolic moieties.



138 With nonethylenic, nonaldehyde, or nonaldehyde-type reactant containing an atom other than C, H, or O:

This subclass is indented under subclass 134. Subject matter wherein there is present an additional reactant which is not ethylenic, nor an aldehyde or derivative thereof, e.g., pretreating phenol and formaldehyde with lead oxide and wherein the resulting lead oxide-containing condensate is blended with butyl rubber, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

136, for a lead-containing phenolic used as a reactant.

139 Solid polymer derived from ethylenic reactants only is derived from reactant containing at least two ethylenic groups:

This subclass is indented under subclass 134. Subject matter wherein the solid polymer is derived from or reacted with an ethylenic reactant containing plural unsaturated bonds.

140 Phenolic reactant has at least two nuclear carbon atoms directly bonded to extracyclic carbon atoms which extracyclic carbon atoms are not part of a methylol group:

This subclass is indented under subclass 139. Subject matter wherein the phenolic reactant has at least two of its six nuclear carbon atoms bonded directly to extracyclic carbon atoms and which carbon atoms are not part of a methylol group, e.g., 3,4,5-trialkyl phenol, etc.

141 Solid polymer from ethylenic reactants only is derived from both a reactant containing two ethylenic groups and an acyclic monoethylenic hydrocarbon:

This subclass is indented under subclass 139. Subject matter wherein the solid polymerized plural ethylenic reactant was interpolymerized with an acyclic monoethylenic hydrocarbon reactant, e.g., poly(butadiene-propylene), etc.

142 Solid polymer derived from ethylenic reactants only is derived from a nitrogen-containing reactant:

This subclass is indented under subclass 134. Subject matter wherein the solid polymer is derived from or reacted with a nitrogen-containing ethylenic reactant, e.g., acrylamide, 2-vinylpyridine, etc.

143 Solid polymer derived from ethylenic reactants only is derived from a reactant containing a carboxylic acid or derivative thereof:

This subclass is indented under subclass 134. Subject matter wherein the solid polymer is derived from or reacted with an ethylenic reactant containing a carboxylic acid group or derivative thereof, e.g., acrylic acid, maleic acid, etc.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 142, wherein the acid derivative is nitrogen-containing (e.g., a nitrile, amide, etc.).
- 144 Solid polymer derived from ethylenic reactants only is derived from a reactant containing at least one halogen atom:**
 This subclass is indented under subclass 134. Subject matter wherein the solid polymer is derived from or reacted with an ethylenic reactant containing a halogen-atom (e.g., tetrafluoroethylene, vinyl(idene) chloride, etc.).
- 145 Solid polymer derived from ethylenic reactants only is derived from an acyclic hydrocarbon:**
 This subclass is indented under subclass 134. Subject matter wherein the solid polymer is derived from or reacted with an unsaturated acyclic hydrocarbon.
- 146 With a -OO- or halhal group-containing reactant or polymer thereof:**
 This subclass is indented under subclass 132. Subject matter wherein the solid polymerized ethylenic reactant is contacted with a reactant containing a carbonate (-OO-), halocarbonate (-OCl) group or carbonyl halide (halhal) or polymers thereof.
- 147 Two or more diverse phenolic reactants, or phenolic reactant contains an atom other than C, H, or O:**
 This subclass is indented under subclass 146. Subject matter wherein there are two or more different phenolic reactants, or a phenolic reactant which contains an element other than C, H, or O.
- 148 Solid polymer derived from ethylenic reactants only is derived from a reactant containing a carboxylic acid or derivative thereof:**
 This subclass is indented under subclass 146. Subject matter wherein the solid polymer is derived from or reacted with an ethylenic reactant containing a carboxylic acid group or a derivative thereof (e.g., acrylic, acid, etc.).
- 149 Contains ethylenic reactant other than from a solid polymer derived from ethylenic reactants only, e.g., reaction product from a phenol and unsaturated hydrocarbon, etc.:**
 This subclass is indented under subclass 132. Subject matter wherein there is an additional reactant which is ethylenically unsaturated or is an ethylenically unsaturated polymer not derived solely from ethylenic reactants.
- 150 Phenolic reactant contains a phosphorus or sulfur atom or with phosphorus- or sulfur-containing reactant:**
 This subclass is indented under subclass 132. Subject matter wherein the phenolic reactant contains phosphorus or sulfur, or wherein a nonphenolic nonethylenic reactant contains phosphorus or sulfur.
- 151 Solid polymer derived from ethylenic reactants only is derived from a reactant containing at least one halogen atom:**
 This subclass is indented under subclass 132. Subject matter wherein the solid polymer is derived from or reacted with an ethylenic reactant containing halogen.
- 152 Solid polymer derived from ethylenic reactants only is derived from a reactant containing a polycyclic ring system or two or more ethylenic groups:**
 This subclass is indented under subclass 132. Subject matter wherein the solid polymer is derived from or reacted with an ethylenic reactant which contains a fused or bridged ring system or plural unsaturated groups (e.g., butadiene, dicyclopentadiene, etc.).
- SEE OR SEARCH CLASS:
 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fused or bridged ring system".
- 153 With saturated ketone reactant or polymer thereof; or with solid copolymer derived from at least one ketone reactant wherein at least one of the reactants forming the solid copolymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients is a ketone or with a reaction product thereof; or with a specified intermediate condensation product containing a ketone group:**
 This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only,

there is additionally present (a) a saturated ketone reactant or a polymer thereof, or (b) a solid copolymer derived from a ketone-containing reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (c) specified polymer-forming ingredients wherein at least one of the necessary polymer-forming ingredients contains a ketone group and at least one of the necessary polymer-forming ingredients is saturated or a reaction product thereof, or (d) a specified intermediate condensation product which contains a ketone group.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "specified polymer-forming ingredients", "specified intermediate condensation product", and "ketone".

- 154 With saturated aldehyde or aldehyde derivative (including methylol ethers or condensates) reactant or solid polymer thereof; or with solid copolymer derived from at least one aldehyde or aldehyde derivative reactant wherein at least one of the reactants forming the solid copolymer is saturated; or with specified polymer-forming ingredients wherein at least one of the necessary ingredients is an aldehyde or aldehyde derivative reactant or with a reaction product thereof, or with specified intermediate condensation product containing an aldehyde or aldehyde derivative:**

This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a saturated aldehyde or aldehyde derivative (including methylol ethers or condensates) reactant or a polymer thereof, or (b) a solid copolymer derived from an aldehyde or aldehyde derivative reactant wherein at least one of the reactants forming the solid copolymer is saturated, or (c) specified polymer-forming ingredients wherein at least one of the necessary polymer-forming ingredients contains an aldehyde or derivative group and at least one of the necessary polymer-forming ingredients is saturated or a reaction product or condensate thereof, or (d) a specified intermediate condensation product which contains an aldehyde or aldehyde derivative group.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the terms "aldehyde", "aldehyde derivative", "specified polymer-forming ingredients", and "specified intermediate condensation product".

- 155 Contacting two or more solid polymers derived from ethylenic reactants only with an aldehyde or aldehyde-type reactant; or contacting a polymer derived from ethylenic reactants only with an aldehyde or aldehyde-type reactant and subsequently contacting with a solid polymer derived from ethylenic reactants only:**

This subclass is indented under subclass 154. Subject matter wherein a solid polymer from ethylenic reactants only is contacted with an aldehyde reactant, aldehyde derivative, or polymer thereof concurrently or subsequently to the contacting with another solid polymer from ethylenic reactants only.

- 156 Contacting with a hydrocarbon and an aldehyde or aldehyde derivative as reactants at least one of which is saturated, their condensate or solid polymer thereof:**

This subclass is indented under subclass 154. Subject matter wherein the solid polymer from ethylenic reactants only is contacted with a hydrocarbon and an aldehyde or aldehyde derivative as reactants, aldehyde-hydrocarbon condensate or the corresponding solid polymer thereof. The hydrocarbon reactant may not be a solid polymer from ethylenic reactants only (e.g., polyvinyl-naphthalene) which is then further condensed with formaldehyde. However, it can be vinyl naphthalene condensed with formaldehyde and subsequently contacted with a solid polymer derived from ethylenic reactants only.

SEE OR SEARCH THIS CLASS, SUBCLASS:

155, for the reaction of an aldehyde with a solid polymer from ethylenic reactants only subsequently mixed with a chemically dissimilar solid polymer derived from ethylenic reactants only.

- 157 Contacting with an amine, a material containing a N or N (X is chalcogen) reactant**

and an aldehyde or aldehyde derivative at least one of which is saturated, their condensate or solid polymer thereof:

This subclass is indented under subclass 154. Subject matter wherein the polymer from ethylenic reactants only is contacted with an amine, a material containing a N or N moiety and an aldehyde or aldehyde derivative as reactants, their condensate or solid polymer thereof (X is chalcogen).

158 Reactant, condensate, or solid polymer contains an element other than C, H, N, or O; or wherein a co-reactant is not an aldehyde, or aldehyde-type reactant alcohol, amine, or reactant containing a N group:

This subclass is indented under subclass 157. Subject matter wherein the condensate or corresponding solid polymer thereof contains an element other than C, H, O, or N; or wherein a co-reactant is not an aldehyde, aldehyde-type, alcohol, amine, or N group-containing reactant.

159 This subclass is indented under subclass 157. Reactant derived from alcohol containing an aryl group or eight or more carbon atoms: Subject matter wherein the reactant is derived from an alcohol containing at least eight carbon atoms or one which contains an aromatic ring other than as a phenol, e.g., polymethyl acrylate and a condensate from n-octanol, formaldehyde and melamine, etc.

160 Solid polymer derived from ethylenic reactants only contains an element other than C, H, O, or N:

This subclass is indented under subclass 157. Subject matter wherein the solid polymer is derived from or is reacted with an ethylenic reactant containing an element other than C, H, O, or N, e.g., vinyl sulfonamide, $\text{CH}_2=\text{CH-SO}_2\text{NH}_2$, etc.

161 Solid polymer derived from ethylenic reactants only derived from reactant containing a heterocyclic ring or a fused- or bridged-ring system excluding an anhydride group which produces the fused- or bridged-ring system or heterocyclic ring:

This subclass is indented under subclass 157. Subject matter wherein the solid polymer is derived from or reacted with ethylenic reactant containing a heterocyclic ring, fused- or

bridged-ring system other than solely from cyclic anhydrides.

- (1) Note. Excluded from this subclass are ethylenic reactants that contain a single heterocyclic ring and which ring is a cyclic anhydride. Also excluded from this subclass are those compounds which are bridged or fused solely by virtue of a cyclic anhydride ring fused or bridged to another ring. This subclass does include cyclic anhydride rings when in combination with other heterocyclic rings or compounds which may have a ring system such as,

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural rubbers, the Glossary, for a definition of the term "fused or bridged ring systems".

162 Solid polymer derived from ethylenic reactant only derived from reactant containing hydroxyl or ether group:

This subclass is indented under subclass 157. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or reacted with an ethylenic reactant containing an ether or hydroxyl group, e.g., 2-hydroxyethyl acrylate, etc.

163 Solid polymer derived from ethylenic reactants only containing a carboxylic acid, ester, or anhydride group:

This subclass is indented under subclass 157. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenic reactant containing a carboxylic acid, ester, or anhydride group.

164 Solid polymer derived from unsaturated hydrocarbon:

This subclass is indented under subclass 157. Subject matter wherein the solid polymer from ethylenic reactants only is derived from or has been reacted with an ethylenic hydrocarbon.

165 With polycarboxylic acid or derivative and a polyol at least one of which is saturated, a condensate or solid polymer thereof; or with solid polymer derived from at least one polycarboxylic acid or derivative and at least one

polyol wherein at least one of the reactants forming the solid polymer is saturated:

This subclass is indented under subclass 55. Subject matter wherein, in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a solid polymer derived from at least one polycarboxylic acid or derivative and at least one polyol and wherein at least one of the reactants forming the solid polymer is saturated, or (b) polymer-forming ingredients wherein at least one of the necessary reactants is a polycarboxylic acid or derivative and at least one of the necessary reactants is a polyol and at least one of the necessary polymer-forming ingredients is saturated, or a reaction product thereof.

166 Two or more solid polymers present other than derived from a polycarboxylic acid or derivative and a polyol:

This subclass is indented under subclass 165. Subject matter wherein there are present in the mixture two or more solid polymers other than those derived from condensations of a polycarboxylic acid or derivative and a polyol.

167 Polycarboxylic acid or derivative or polyol contains an atom other than C, H, or O; or wherein a polycarboxylic acid or derivative or polyol or condensate thereof is reacted with a reactant containing atoms other than C, H, or O prior to blending with the solid polymer; or wherein a coreactant with the polycarboxylic acid or derivative or polyol contains an atom other than C, H, or O:

This subclass is indented under subclass 165. Subject matter wherein the polycarboxylic acid or derivative or polyol contains an element other than C, H, or O; or wherein the polycarboxylic acid or derivative, polyol or reaction product thereof is reacted with a compound containing elements other than C, H, or O prior to blending with the solid polymerized ethylenic reactant; or wherein the coreactant with the polycarboxylic acid, derivative, or polyol contains an element other than C, H, or O.

167.5 With a reactant which is a fatty acid glycerol ester, a fatty acid or salt derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil:

This subclass is indented under subclass 165. Subject matter wherein there is at least one reactant which is a fatty acid glycerol ester, or a

fatty acid or salt thereof derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil.

- (1) Note. The recited fatty material is reacted with the solid polymer derived from ethylenic reactants only; or with the polycarboxylic acid or derivative or polyol, or with the condensate or solid polymer thereof.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fatty acid" and of other materials proper for this subclass.

168 Polycarboxylic acid or derivative, polyol, or other co-reactant contains an ethylenic group; or wherein a condensate thereof has been prepared from a polycarboxylic acid or derivative and a polyol and subsequently reacted with an ethylenic reactant:

This subclass is indented under subclass 165. Subject matter wherein the polycarboxylic acid or derivative thereof, polyol or other coreactant contains an ethylenic group; or wherein an ethylenic material contacts the polyol or polycarboxylic acid or reaction product thereof prior to contacting the solid polymer from ethylenic reactants only; and wherein said ethylenic material is not a solid polymer derived from ethylenic reactants only.

169 Solid polymer derived from ethylenic reactants only derived from at least one reactant containing an atom other than C, H, or O:

This subclass is indented under subclass 168. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant containing an element other than C, H, or O.

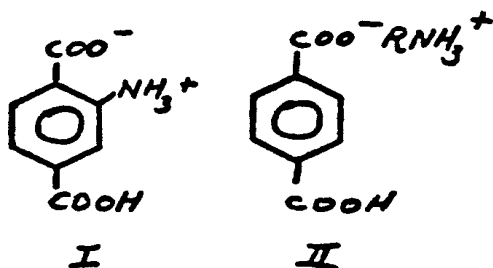
170 Solid polymer derived from ethylenic reactants only derived from at least one reactant containing an oxygen atom:

This subclass is indented under subclass 168. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant containing an oxygen atom.

171 Solid polymer derived from ethylenic reactants only derived from at least one hydro-

- gen reactant containing at least two ethylenic groups:**
This subclass is indented under subclass 168. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic hydrocarbon, e.g., butadiene, etc.
- 172 Polycarboxylic acid or derivative contains three or more carboxylic acid groups or derivatives thereof, or wherein a polyol contains at least three hydroxyl groups:**
This subclass is indented under subclass 165. Subject matter wherein the polycarboxylic acid contains at least three carboxylic groups or derivative thereof; or wherein the polyol contains at least three hydroxyl groups.
- 173 From two or more polyols:**
This subclass is indented under subclass 165. Subject matter wherein two or more polyols are utilized (e.g., mixture of propylene and butylene glycol, etc.).
- 174 From two or more carboxylic acids or derivatives thereof:**
This subclass is indented under subclass 165. Subject matter wherein two or more carboxylic acids or their derivatives are utilized.
- 175 Solid polymer derived from ethylenic reactants only derived from at least one reactant containing an atom other than C, H, O, or hal:**
This subclass is indented under subclass 165. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant containing an element other than C, H, O, or halogen.
- 176 Solid polymer derived from ethylenic reactants only derived from at least one reactant containing an oxygen atom:**
This subclass is indented under subclass 165. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant containing an oxygen atom.
- 177 Solid polymer derived from ethylenic reactants only derived from unsaturated hydrocarbon:**
This subclass is indented under subclass 165. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant which is a hydrocarbon.
- 178 With a polycarboxylic acid or derivative and a polyamine or the corresponding salt thereof; or with a lactam; or with an aminocarboxylic acid; or with the corresponding polymers; and wherein the monomer or polymer was derived from at least one saturated reactant:**
This subclass is indented under subclass 55. Subject matter wherein in addition to the solid polymer derived from ethylenic reactants only, there is additionally present (a) a polycarboxylic acid or derivative and a polyamine at least one of which is saturated or a polymer or condensate thereof; or a saturated lactam or polymer thereof; or a saturated aminocarboxylic acid or polymer thereof, or an amine salt of a saturated carboxylic acid or polymer thereof; or (b) a solid polymer derived from at least one lactam, aminocarboxylic acid, amine salt of a polycarboxylic acid, or polycarboxylic acid and a polyamine and at least one of the reactants forming the solid polymer is saturated.
- 179 Two or more solid polymers other than prepared from a polycarboxylic acid or derivative and a polyamine, a lactam, an aminocarboxylic acid or derivative, or from a polyamine salt of a polycarboxylic acid:**
This subclass is indented under subclass 178. Subject matter wherein there are at least two solid polymers present which are other than derived from the reaction of a polyamine and a polycarboxylic acid or derivative, or from a lactam, or from an aminocarboxylic acid or derivative, or from an amine salt of a polycarboxylic acid, e.g., in subclass 178, e.g., an applicable mixture would be polystyrene, poly(methyl methacrylate) and nylon-6.
- 180 Polycarboxylic acid or derivative contains three or more carboxylic acid groups; or polyamine contains three or more amino groups; or from an amino-containing polycarboxylic acid or derivative other than amine solely in salt form; or from polyamino carboxylic acid or derivative other than wherein amino groups are solely in salt form:**
This subclass is indented under subclass 178. Subject matter wherein the polycarboxylic acid or derivative contains at least three carboxylic acid groups or derivatives, or wherein a polyamine contains at least three amino

groups; or wherein the polycarboxylic acid contains at least one amine group excluding those appearing in the form of nonzwitterionic cation. Thus, structure I below is permitted while structure II is not, or from a carboxylic acid containing at least two amino groups excluding those appearing in the form of nonzwitterionic cation.



SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, Glossary for the definition of the term "carboxylic acid and amine group".

181 With ethylenically unsaturated reactant; or reactant contains a heterocyclic ring other than solely as a lactam or cyclic anhydride of a polycarboxylic acid:

This subclass is indented under subclass 178. Subject matter wherein a reactant contains an ethylenic group; or reactant contains a heterocyclic ring other than solely as an anhydride or lactam, e.g., maleic acid.

- (1) Note. Excluded from this subclass are ethylenic monomers that contain a single heterocyclic ring and which ring is a cyclic anhydride. This subclass does not exclude a cyclic anhydride ring when in combination with a noncyclic anhydride ring.

SEE OR SEARCH THIS CLASS, SUBCLASS:

178, for the situation wherein the ethylenic reactant may be introduced subsequent to the solid polymer.

182 Solid polymer derived from ethylenically unsaturated reactant only is one derived from a reactant containing a heterocyclic

ring and is other than solely a cyclic anhydride of a polycarboxylic acid:

This subclass is indented under subclass 178. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant which is a heterocyclic compound other than solely as a carboxylic acid anhydride, e.g., N-vinylpyrrolidone, glycidyl methacrylate and N-vinylcarbazole, etc.

- (1) Note. Excluded from this subclass are ethylenic monomers that contain a single heterocyclic ring and which ring is a cyclic anhydride. This subclass does not exclude a cyclic anhydride when in combination with a noncyclic anhydride ring.

SEE OR SEARCH THIS CLASS, SUBCLASS:

183, for a solid polymer derived from maleic anhydride.

183 Solid polymer derived from ethylenically unsaturated reactant only is derived from a reactant containing a carboxylic acid or derivative:

This subclass is indented under subclass 178. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant containing a carboxylic acid or derivative thereof.

184 Solid polymer derived from ethylenically unsaturated hydrocarbon:

This subclass is indented under subclass 178. Subject matter wherein the solid polymer is derived from or has been reacted with an ethylenic reactant which is a hydrocarbon.

185 With additional solid polymer derived from at least one nonethylenic reactant:

This subclass is indented under subclass 55. Subject matter wherein the solid polymer derived from ethylenic reactants only is contacted with an additional solid polymer derived from at least one nonethylenic reactant, e.g., a copolymer derived from carbon monoxide and ethylene, etc.

- 186 At least one reactant which forms additional polymer contains a heterocyclic ring:**
This subclass is indented under subclass 185. Subject matter wherein the additional solid polymer is derived from a heterocyclic reactant.
- 187 Heterocyclic ring is an 1,2-epoxy ring:**
This subclass is indented under subclass 186. Subject matter wherein the heterocyclic reactant is a 1,2-epoxy (oxirane) compound, e.g., epichlorohydrin, etc.
- 188 At least one reactant which forms additional polymer contains a phosphorus atom:**
This subclass is indented under subclass 185. Subject matter wherein the additional solid polymer is derived from a reactant containing phosphorus.
- 189 At least one reactant which forms additional polymer contains a sulfur atom:**
This subclass is indented under subclass 185. Subject matter wherein the additional solid polymer is derived from a reactant containing sulfur.
- 190 At least one reactant which forms additional polymer contains a carboxylic acid or derivative:**
This subclass is indented under subclass 185. Subject matter wherein the additional solid polymer is derived from a reactant which is a carboxylic acid or derivative.
- 191 Polymer mixture of two or more solid polymers derived from ethylenically unsaturated reactants only; or mixtures of said polymer mixture with a chemical treating agent; or products or processes of preparing any of the above mixtures:**
This subclass is indented under subclass 55. Subject matter which concerns mixing of two or more solid polymers derived from ethylenically unsaturated reactants only, a mixture of said polymer mixture with a chemical treating agent, or processes of forming or the resultant product of any of the above mixtures.
- (1) Note. Excluded from this subclass are multi-step polymerization-postpolymerization processes which occurs in the presence of a single preformed solid polymer from ethylenic reactants only and an ethylenic reactant which affords a polymeric mixture.
- (2) Note. Placement of a patent in this subclass is on the basis of the ethylenic reactants used in the preparation of solid polymer and not on the basis of ethylenic reactants which may be reacted with a mixture of solid polymers from ethylenic reactants only.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 193, for metalation of polystyrene blended with polybutadiene which is subsequently contacted with butadiene.
- 242+, for lithiation of styrene in the presence of polyethylene to yield lithium. Terminated polystyrene followed by its reaction with butadiene to produce block (polybutadiene . polystyrene) in admixture.
- 192 Treating polymer or polymer mixture with a chemical treating agent other than solid polymer:**
This subclass is indented under subclass 191. Subject matter drawn to processes of treating a polymer or polymer mixture with a chemical agent.
- (1) Note. In the Class Definition of this class, see Lines With Other Classes and Within This Class, section II, B(1) for lines between this subclass and its indents.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 199, through 241, for a product which is the result of a treating process proper for this subclass and its indents.
- 193 Agent contains an ethylenic group:**
This subclass is indented under subclass 192. Subject matter wherein the treating agent is ethylenically unsaturated.
- (1) Note. Included herein are polymers which were obtained only from ethylenic reactants as treating agents.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70+, for a polymeric mixture containing a graft copolymer derived from ethylenic reactants only; or for a process or product obtained by treating an ethylenic reactant which reacts with the polymer and which resultant product is admixed with an additional solid polymer.

88+, for a polymeric mixture containing a block copolymer derived from ethylenic reactants only or for a process or product obtained by treating a mixture of polymers having functional terminal ends or with a coupling agent and subsequently contacting said product with an additional solid polymer.

194 Agent is an organic material:

This subclass is indented under subclass 192. Subject matter wherein the chemical treating agent is organic material.

195 Contains a metal atom:

This subclass is indented under subclass 194. Subject matter wherein the organic treating agent is one which also contains a metal atom in an inorganic or organic compound (e.g., trialkyl aluminum, etc.).

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary for the elements considered as being metals.

196 Agent contains a metal atom:

This subclass is indented under subclass 192. Subject matter wherein the chemical treating agent contains a metal atom.

197 Specified blending process:

This subclass is indented under subclass 191. Subject matter drawn to processes which involve specified blending operations associated with preparing the polymeric mixture.

- (1) Note. The blending operation must be accompanied by some specific process limitations. Thus, if blending is accomplished by a simple "melt or fusion" blending then it is necessary to state a required temperature range. Similarly, if

blending is accomplished by dissolving the polymers in one or more solvents, then it is necessary to specify at least the nature of the solvents, e.g., 2:1 solvent mixture of carbontetrachloride-benzene or 2:1 solvent mixture of halogenated hydrocarbon with aromatic hydrocarbon. In a multistep blending operation which includes heating, it is not necessary that the temperature be specified. Also, permissible are blending processes wherein heating is the only step but which do not disclosed specified temperatures when the polymers or polymer system are required to conform to certain parameters. For example, polymers A and B are heated above their glass transition temperatures (T_g) and then blended; or polymer A is heated to viscosity V_1 and polymer B is heated viscosity V_2 and then blended. Terms such as "... blending and heating . . . or" . . . mixing and vulcanizing . . ." are specific enough to be classified here. Some indication as to mixing at a given r.p.m. or vulcanizing at a given temperature would be adequate information.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

199, through 241, for a product which is the result of a specified blending process.

198 With subsequent physical treatment:

This subclass is indented under subclass 197. Subject matter wherein the blending process is accompanied by a subsequent physical treatment; e.g., masticating (crushing), prilling (pelletizing), evaporation of solvent, shearing, rolling, pressing, milling, granulating, etc.

199 Solid polymer derived from fluorine-containing ethylenic reactant:

This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an unsaturated fluorine-containing reactant, e.g., vinylidene fluoride, vinyl fluoride, etc.

200 Fluorine reactant contains atoms other than C, H, or Hal:

This subclass is indented under subclass 199. Subject matter wherein the unsaturated fluorine-containing reactant contains elements other than carbon, hydrogen, or halogen, e.g., pentafluoroethyl acrylate, etc.

201 Solid polymer derived from metal-containing ethylenic reactant:

This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from a metal-containing ethylenic reactant, e.g., sodium acrylate, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221, for a mixture containing a metal-containing polymer produced by the neutralization of polyacrylic acid with metal hydroxide.

202 Solid polymer derived from reactant containing an acetylenic group:

This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from a reactant containing an acetylenic group, e.g., polyacetylene, sometimes called cuprene, etc.

203 Solid polymer derived from ethylenic reactant containing a heterocyclic nitrogen:

This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing a nitrogen heterocycle (e.g., 2-vinyl pyridine, etc.).

204 Heterocyclic reactant contains at least two hetero atoms in a single ring and at least one of which is nitrogen:

This subclass is indented under subclass 203. Subject matter wherein the nitrogen heterocycle contains two or more atoms in the same ring and wherein at least one of the hetero atoms is nitrogen.

(1) Note. The hetero ring may contain two or more nitrogen atoms or at least one nitrogen atom and at least one diverse hetero atom as oxygen, etc.

205 Heterocyclic reactant is an imide or lactam:

This subclass is indented under subclass 203. Subject matter wherein the nitrogen heterocycle is an imide or a lactam, e.g., maleimide, N-vinyl pyrrolidone, etc.

SEE OR SEARCH CLASS:

520, Synthetic Resins and Natural Rubbers, Glossary for a definition of the term "carboxylic acid or derivative" which defines "imide" and "lactam".

206 Solid polymer derived from reactant containing a chalcogen atom (O, S, Se, Te) as part of a heterocyclic ring:

This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing a chalcogen (O, S, Se, Te) heterocycle (e.g., coumarone, furfuryl acrylate, etc.).

207 Heterocyclic reactant contains anhydride group:

This subclass is indented under subclass 206. Subject matter wherein the chalcogen heterocycle contains an anhydride group (e.g., maleic anhydride, etc.).

SEE OR SEARCH CLASS:

520, Synthetic Resins and Natural Rubbers, the Glossary, for a definition of the term "carboxylic acid or derivative" which defines "carboxylic acid anhydride".

208 Heterocyclic reactant contains 1, 2-epoxy group:

This subclass is indented under subclass 206. Subject matter wherein the chalcogen heterocycle contains two carbon atoms and one chalcogen atom (e.g., glycidyl acrylate, allyl glycidyl ether, etc.).

209 Solid polymer derived from reactant containing elements other than C, H, O, N, S, or Cl:

This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing elements other than carbon, hydrogen, nitrogen, oxygen, sulfur, or chlorine

- (e.g., bis(beta-chorethyl)-vinylphosphonate (CLCH₂CH₂)₂CH=CH₂, etc.).
- 210 Solid polymer derived from reactant containing a fused- or bridged-ring system:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from a reactant containing a fused or bridged ring system (e.g., indene, pinene, etc.).
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fused or bridged ring system."
- 211 Fused- or bridged-ring reactant contains at least two ethylenic groups:**
This subclass is indented under subclass 210. Subject matter wherein a solid polymer is derived from a fused- or bridged-ring reactant which contains plural ethylenically unsaturated groups, e.g., dicyclopentadiene, etc.
- 212 Solid polymer derived from sulfur-containing reactant:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing sulfur.
- 213 Solid polymer derived from chlorine-containing reactant other than vinyl (idene) chloride:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from a reactant containing halogen other than vinyl vinylidene chloride (e.g., alphachloroacrylonitrile, etc.).
- SEE OR SEARCH THIS CLASS, SUBCLASS:
239, for a mixture containing a solid polymer derived from vinyl or vinylidene chloride.
- 214 Halogenated hydrocarbon other than vinyl-(idene) chloride:**
This subclass is indented under subclass 213. Subject matter wherein the halogen-containing ethylenic reactant, which is other than vinyl or vinylidene chloride, is a halogenated hydrocarbon (e.g., 1,2-dichloroethylene, etc.).
- 215 Halogenated hydrocarbon contains at least two ethylenic groups and is devoid of an aryl ring:**
This subclass is indented under subclass 214. Subject matter wherein the halogenated hydrocarbon contains plural ethylenically unsaturated groups, and is free of any aromatic group (e.g., 2-chloroprene, etc.).
- 216 Solid polymer derived from cycloaliphatic-containing reactant:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing a cycloaliphatic group (e.g., cyclopentene, etc.).
- 217 Solid polymer derived from reactant containing nitrogen atom other than from (meth)acrylonitrile:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing nitrogen, other than as acrylonitrile or methacrylonitrile (e.g., 2-cyanoethylacrylate, etc.).
- SEE OR SEARCH THIS CLASS, SUBCLASS:
238, for a solid polymer derived from acrylonitrile or methacrylonitrile.
- 218 Nitrogen reactant contains a carboxylic acid amide group:**
This subclass is indented under subclass 217. Subject matter wherein the nitrogen-containing ethylenic reactant contains a carboxylic acid amide group (e.g., acrylamide, etc.).
- 219 Solid polymer derived from reactant containing a phenolic group:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant containing an aromatic hydroxyl or aromatic ether group.
- 220 Solid polymer derived from reactant containing a carbonyl acid or derivative:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant which contains a carbonyl group () other

- than as part of a carboxylic acid or derivative (e.g., methylisopropenyl ketone, etc.).
- SEE OR SEARCH THIS CLASS, SUBCLASS:
221, and 222+, for a mixture containing a solid polymer derived from a carboxylic acid or derivative.
- 221 Solid polymer derived from reactant containing a carboxylic acid group:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant which contains a carboxylic acid group, e.g., acrylic acid, maleic acid, etc.
- SEE OR SEARCH CLASS:
520, Synthetic Resins and Natural Rubbers, Glossary for a definition of the term "carboxylic acid or derivative".
- 222 Solid polymer derived from reactant containing a carboxylic acid ester group:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant which contains a carboxylic acid ester group (e.g., vinyl acetate, etc.).
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "carboxylic acid or derivative" which defines "carboxylic acid ester".
- 223 Ester contains an oxygen atom other than as part of a carboxylic acid ester group:**
This subclass is indented under subclass 222. Subject matter wherein the ester reactant contains an oxygen atom other than as part of a carboxylic acid ester group, e.g., 2-hydroxyethyl acrylate, etc.
- 224 Ester derived from both an unsaturated carboxylic acid and an unsaturated alcohol:**
This subclass is indented under subclass 222. Subject matter wherein the ester reactant is derived both from an unsaturated carboxylic acid and an unsaturated alcohol (e.g., diallyl fumarate, etc.).
- 225 Ester contains at least two carboxylic acid ester groups:**
This subclass is indented under subclass 222. Subject matter wherein the ester reactant contains at least two ester groups, e.g., dibutyl maleate, dimethyl itaconate, etc.
- 226 Ester derived from polyol:**
This subclass is indented under subclass 225. Subject matter wherein the reactant is derived from a polyol, e.g., ethylene glycol diacrylate, etc.
- 227 Ester derived from an unsaturated carboxylic acid:**
This subclass is indented under subclass 222. Subject matter wherein the reactant is derived from an unsaturated carboxylic acid (e.g., ethyl acrylate, n-propyl crotonate, etc.).
- 228 At least two polymers derived from carboxylic acid ester reactants:**
This subclass is indented under subclass 227. Subject matter wherein the polymeric mixture contains two or more solid polymers derived from carboxylic acid esters and at least one of said esters is derived from an unsaturated carboxylic acid (e.g., poly(butadiene-methyl acrylate) mixed with poly(methyl methacrylate), etc.).
- 229** This subclass is indented under subclass 228. Ester derived from an unsaturated alcohol: Subject matter wherein at least one of the solid polymers is derived from an ester reactant containing a moiety derived from an unsaturated alcohol; e.g., a mixture of poly(methyl methacrylate-vinyl acetate) and poly(butyl acrylate-vinyl acetate), etc.
- 230 Polymer derived from nitrogen-containing reactant:**
This subclass is indented under subclass 227. Subject matter wherein a solid polymer is derived from a nitrogen-containing reactant (e.g., acrylonitrile, etc.).
- 231 Solid polymer derived from oxygen-containing reactant:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reac-

- tant containing oxygen (e.g., vinyl methyl ether, etc.).
- 232 Solid polymer derived from reactant containing at least two ethylenic groups and is devoid of aryl ring:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an ethylenic reactant which contains at least two ethylenic groups and is free of an aromatic group (e.g., butadiene, isoprene, etc.).
- 233 Polymer derived from nitrogen-containing reactant:**
This subclass is indented under subclass 232. Subject matter wherein a solid polymer is derived from a nitrogen-containing ethylenic reactant 9e.g., acrylonitrile, etc.0.
- 234 At least two polymers derived from nitrogen-containing reactants:**
This subclass is indented under subclass 233. Subject mixture wherein the polymeric mixture contains at least two solid polymers derived from nitrogen-containing reactants (e.g., poly(butadiene-acrylonitrile) mixed with poly(vinylchloride-acrylonitrile), etc.).
- 235 Polymer derived from halogen-containing reactant:**
This subclass is indented under subclass 232. Subject matter wherein a solid polymer is derived from vinyl chloride or vinylidene chloride.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
199+, and 213+, for a polymer derived from a halogen-containing reactant other than vinyl or vinylidene chloride.
- 236 At least two polymers derived from reactants containing two or more ethylenic groups and devoid of an aryl ring:**
This subclass is indented under subclass 232. Subject matter wherein the polymeric mixture contains two or more solid polymers derived from reactants which contain two or more ethylenic groups and no aromatic group.
- 237 At least one of three polymers is derived from two or more reactants:**
This subclass is indented under subclass 236. Subject matter wherein at least one solid polymer is derived from two or more reactants, e.g., poly(butadiene-styrene), etc.
- 238 Solid polymer derived from (meth)acrylonitrile:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from (meth)acrylonitrile.
- 239 Solid polymer derived from vinyl(idene) chloride:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from vinyl(idene) chloride.
- 240 Solid polymer derived from ethylene or propylene:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from ethylene or propylene.
- 241 Solid polymer derived from an aromatic hydrocarbon reactant:**
This subclass is indented under subclass 191. Subject matter wherein the mixture contains a solid polymer derived from an aromatic hydrocarbon (e.g., styrene, etc.).
- 242 Polymer derived from ethylenic reactants only mixed with ethylenic reactant:**
This subclass is indented under subclass 55. Subject matter wherein a solid polymer derived from ethylenically unsaturated reactants only is mixed with an ethylenic reactant, processes of mixing, or the resultant product of any of the above mixture, e.g., graft copolymerization of poly(styrene-butadiene) with acrylonitrile or the block copolymerization of polystyrene with butadiene, etc.
- (1) Note. This and indented subclasses contain as shown above graft and block copolymers whenever prepared according to the limitations set forth under this subclass. Thus, the process and product of preparing a mixture of graft

poly(butadiene-styrene-polystyrene-acrylonitrile) with poly(styrene-acrylonitrile) starting with polybutadiene and styrene and acrylonitrile, is classified here.

- (2) Note. This and indented subclasses also contain polymers prepared from a combination of ethylenic reactants mixed with nonethylenic reactants when reacted in the presence of ethylenically polymerized polymers, e.g., ethylene-ethylene oxide copolymer, propylene-sulfur dioxide copolymer. In the Class Definition of this class, see Lines With Other Classes and Within This Class, section II. B(2) for lines between this subclass and its indents.
- (3) Note. This and indented subclasses also contain those products and compositions derived from the contacting of solid polymers from ethylenic reactants only with ethylenic materials wherein the ethylenic reactant interacts with the polymer without undergoing simultaneous or subsequent polymerization; (e.g., treating poly(2-hydroxyethyl-acrylate) with acrylyl chloride or polyacrylic acid with allylamine, etc.).
- (4) Note. Patents in the area are placed in the first subclass that provides for the solid polymer or ethylenic monomer. No distinction has been made as to amounts of required materials. Solid polymers from ethylenic reactants only are classified on the basis of the initial ethylenic reactants utilized in preparing same. No weight, for purposes of classification, has been given to polymers which have been post-treated chemically to introduce atoms therein or remove atoms which were part of the original polymer prior to introduction of the ethylenic monomer. See the Search Note below.
- (5) Note. In those subclasses indented hereinbelow which recite "Block" in the title, the requirement for placement of a document therein is that the required ethylenic material as noted by the subclass title be in the block portion of the poly-

mer and not in the graft portion of the molecule.

- (6) Note. An ethylenic reactant requires the presence of two carbon atoms bonded together by a double or triple bond, with the proviso that the double bond is not part of an aromatic ring, or of a ring which shares a double bond with an aromatic ring. The term aromatic denotes a compound which contains a benzene nucleus whether or not it is condensed with other rings. Reactants such as furan, thiophene and pyrrole would thus meet the requirements for a ethylenically unsaturated compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 313, for the product obtained by halogenating polybutadiene and subsequently mixing same with vinyl chloride where said product is classified on the basis of butadiene.

243 **Reactions with ethylenic reactants in two or more diverse phases, e.g., bulk, emulsion, melt, solution, etc.:**

This subclass is indented under subclass 242. Subject matter wherein one or more polymerization reactions occur in two or more distinct phases.

- (1) Note. This subclass typically covers those manipulative processes involving multiphase preparation of modified polymers, notably graft copolymers, e.g., prepolymerizing by mass polymerization of polybutadiene dissolved in styrene and then dispersing the mixture in an aqueous solution containing a suspending agent and finally polymerizing the suspended prepolymer mixture until substantially all the reactant has been polymerized to afford the final product, etc.

244 **Contacting a solid polymer derived from ethylenic reactants only with an ethylenic reactant in the presence of a specified material:**

This subclass is indented under subclass 242. Subject matter drawn to processes wherein a solid polymer derived from ethylenic reactants

only is contacted with an ethylenic reactant and a specified material.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, or a definition of the term "specified material".

245 Specified material contains transition metal atom:

This subclass is indented under subclass 244. Subject matter wherein the specified material contains a transition metal atom (i.e., the elements of atomic numbers 21-29, 39-47, 57-79, and 89 and higher and does not include Zn, Cd, and Hg).

- (1) Note. The transition metal atom may be in elemental or compound form.

246 In presence of water:

This subclass is indented under subclass 245. Subject matter wherein a transition metal atom, water, and an ethylenic reactant are simultaneously in contact with a solid polymer from ethylenic reactant only.

- (1) Note. The amount of water present during the polymerization process is of no significance (e.g., diluent, catalyst, activator, etc.). The introduction of water may not be explicitly stated but only implied, e.g., the introduction of 37% formalin solution and 37% commercial hydrochloric acid. Nevertheless, these materials are generally recognized as containing water.

247 Contains nontransition metal atom:

This subclass is indented under subclass 245. Subject matter wherein a transition metal atom is in contact with a nontransition metal atom at some time during the contacting process.

- (1) Note. The term nontransition metal is intended to include all metals other than the transition metals.
- (2) Note. The transition metals are the elements of atomic numbers 21-29, 39-47, 57-79, and 89 and higher; Zm, Ch, and Hg are not included.

- (3) Note. The nontransition metal atom may be in the same compound as the transition metal atom or in a different compound, or it may exist in elemental form.

248 Specified material contains a carbon or hydrogen atom bonded directly to a metal atom:

This subclass is indented under subclass 244. Subject matter wherein the specified material contains a metal-to-carbon or metal-to-hydrogen bond (e.g., NaH, $\text{CH}_3\text{CH}_2\text{Li}$, etc.).

249 Metal atom is aluminum:

This subclass is indented under subclass 248. Subject matter wherein the metal associated with the metal-to-carbon or metal-to-hydrogen bond is aluminum (e.g., $\text{Al}(\text{C}_3\text{H}_7)_3$, etc.).

250 Metal atom is Group IA metal atom (Li, Na, K, Rb, Cs, Fr):

This subclass is indented under subclass 248. Subject matter wherein the metal associated with the metal-to-carbon or metal-to-hydrogen bond is a Group IA (L, Na, K, Rb, Cs, Fr) metal atom.

- 251** This subclass is indented under subclass 244. Specified material contains a boron atom: Subject matter wherein the specified material contains a boron atom (e.g., boron-trifluoride etherate complex, etc.).

252 Specified material is a carbohydrate or is a solid synthetic polymer not intended to be in the final product:

This subclass is indented under subclass 244. Subject matter wherein the specified material is a carbohydrate or is a solid synthetic polymer not intended to be in the final product.

SEE OR SEARCH CLASS:

- 523, Synthetic Resins or Natural Rubbers, for polymer composition containing carbohydrates as a nonreacted material.
- 524, Synthetic Resins or Natural Rubbers, for polymer composition containing carbohydrates as a nonreacted material.

- 526, Synthetic Resins or Natural Rubbers, subclasses 200 through 203 for polymerization processes utilizing carbohydrates and synthetic polymers not intended to be in the final product.
- 253 Material contains a free alcohol group or is alcoholate thereof:**
This subclass is indented under subclass 252. Subject matter wherein the specified solid synthetic polymer contains a free alcohol group or is an alcoholate salt thereof, e.g., polyvinyl alcohol, etc.
- 254 Specified material contains silicon atom:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a silicon atom.
- 255 Specified material contains a phosphorus atom:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a phosphorus atom.
- 256 Specified material contains a heterocyclic ring:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a heterocyclic ring, e.g., ethylene oxide, etc.
- 257 Specified material contains a ketone group:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a ketone group.
- SEE OR SEARCH CLASS:
523, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "ketone".
- 258 Specified material contains an ether group:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains an ether group, e.g., polyethylene-glycol, etc.
- 259 Specified material contains an organic nitrogen compound:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a nitrogen atom, which is part of an organic compound, e.g., dimethylacetamide, etc.
- 260 Organic nitrogen compound contains an azo group, i.e., -N=N-:**
This subclass is indented under subclass 259. Subject matter wherein the organic compound contains an azo group, i.e., -N=N-.
- 261 Specified material contains an organic sulfur compound:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a sulfur atom as part of an organic compound (e.g., betamercapto propionic acid, etc.).
- 262 Specified material contains a carboxylic acid or derivative:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a carboxylic acid or derivative thereof.
- 263 Specified material contains a peroxy group, i.e., -O-O-:**
This subclass is indented under subclass 244. Subject matter wherein the specified material contains a peroxy group, i.e., -O-O-, e.g., di-tertiary butyl peroxide, etc.
- 264 Contains nonperoxy compound or inorganic peroxy compound:**
This subclass is indented under subclass 263. Subject matter wherein the specified material contains a nonperoxy compound (i.e., in addition to the peroxy compound) or is an inorganic peroxy compound.
- 265 Aromatic or cycloaliphatic peroxy compound:**
This subclass is indented under subclass 263. Subject matter wherein the peroxy group is part of an aromatic or cycloaliphatic compound (e.g., benzoyl peroxide, etc.).
- 266 Specified material contains an organic chalcogen compound:**
This subclass is indented under subclass 244. Subject matter wherein the specified material is an organic compound which contains a chalcogen atom (O, S, Se, Te).

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
261, for a specified material containing a sulfur atom as part of an organic compound.
- 267 Including step of preparing a polymer in the presence of a specified material and in the absence of a preformed polymer derived from ethylenic reactant only:**
This subclass is indented under subclass 242. Subject matter drawn to processes which include the step of initially preparing a polymer in the presence of a specified material.
- (1) Note. This subclass excludes the presence of a preformed polymer derived from ethylenic reactants only. In the Class Definition of this class, see Lines With Other Classes and Within This Class, section II. B(3) for lines between this subclass and its indents.
- (2) Note. The specified material must present at some time prior to the completion of the in situ polymerization of the initial polymer and may remain during the final reaction with the ethylenic reactant.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the term "specified material".
- 268 Specified material contains a transition metal atom:**
This subclass is indented under subclass 267. Subject matter wherein the specified material contains a transition metal atom.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
245, for the definition of the term "transition metal".
- 269 Transition metal is other than group IVB, VB, or VIB metal atom:**
This subclass is indented under subclass 268. Subject matter wherein the transition metal atom is other than from Groups IVB, VB, or VIB.
- (1) Note. Excluded from this subclass are elements Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, and W.
- 270 With nonmetal nonhydrocarbon compound:**
This subclass is indented under subclass 268. Subject matter wherein, in addition to the transition metal, there is present a nonmetal, nonhydrocarbon compound, e.g., tetrakis (dialkyl amino) silane, etc.
- 271 Specified material contains a group IA atom in elemental form, or bonded to hydrogen or carbon:**
This subclass is indented under subclass 267. Subject matter wherein the specified material contains a Group IA metal in elemental form, or is bonded to hydrogen or carbon, e.g., NaH, CH₃Li, etc.
- 272 Contains an atom other than group IA, C, or H:**
This subclass is indented under subclass 271. Subject matter wherein the specified material contains an element other than from Group IA, C, or H.
- (1) Note. The word "contains" reads generically on the element whether found as an integral part of the specified material required for this subclass or in addition to the specified material.
- (2) Note. Metal borohydrides, e.g., LiBH₄ are classified as if they are hydrides of boron and of the metal atom.
- (3) Note. Metal hydrides (e.g., NaAlH₄) are classified as if they are mixed hydrides of aluminum and of the other metal.
- 273 Specified material contains a compound containing a peroxy group, i.e., -O-O-:**
This subclass is indented under subclass 267. Subject matter wherein the specified material contains a peroxy group, i.e., -O-O-.
- 274 Ethylenic reactant contains a metal atom:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a metal atom.

275 Ethylenic reactant contains an acetylenic group:

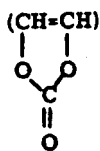
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains an acetylenic ($-C\equiv C-$) group.

276 Ethylenic reactant contains a fluorine atom:

This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains fluorine, e.g., tetrafluoroethylene, polyvinylidene fluoride, etc.

277 Ethylenic reactant contains a carbonate group:

This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a carbonate ($-OO-$) group, wherein the group may be linear, as in diallyl carbonate ($CH_2=CHCH_2OO-CH_2-CH=CH_2$) or cyclic, as in vinylene carbonate ($CH=CH$), etc.

**278 Ethylenic reactant contains a carbamate group:**

This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a carbamate group, wherein the carbamate group may be linear as in N-vinyl tert-butyl carbamate ($CH_2=CH-NHO-t-Bu$) or cyclic, as in N-vinyl-2-oxazolidone, etc.

279 Ethylenic reactant contains nitrogen heterocycle:

This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a nitrogen heterocycle (e.g., 4-vinyl pyridine, etc.).

- (1) Note. An ethylenically unsaturated nitrogen heterocyclic compound may contain a carbon-to-carbon double bond outside (exo) or inside (endo) the ring containing the nitrogen atom (s), e.g., N-vinylpyrrolidone, 1, 2-, 1, 3- and 1, 4-, diazine, pyridine, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

242, for definitions of the terms "ethylenic reactant" and "aromatic".

280 Block copolymer:

This subclass is indented under subclass 279. Subject matter wherein the solid polymer is a block copolymer derived from an ethylenic reactant containing a nitrogen heterocycle, e.g., (poly-2-methyl-3-vinylpyridine-poly-styrene) block copolymer, etc.

- (1) Note. Grafted poly-2-vinyl-pyridine onto (poly-styrene-poly-butadiene) block copolymer is not proper for this subclass but in subclass 279 since the block portion is devoid of a nitrogen reactant.

281 Nitrogen heterocycle contains at least two nitrogen atoms in the same ring:

This subclass is indented under subclass 279. Subject matter wherein the nitrogen heterocycle contains at least two nitrogen atoms in a single ring (e.g., triallyl cyanurate, etc.).

- (1) Note. Compounds of the type, would also be classified here if it is disclosed to be a reactant.

**282 Imide:**

This subclass is indented under subclass 279. Subject matter wherein the nitrogen heterocycle contains an imide group, e.g., maleimide, etc.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, for a definition of the "carboxylic acid or derivative" which defines "imide".

- 283 Lactam:**
This subclass is indented under subclass 279. Subject matter wherein nitrogen heterocycle contains a lactam group (e.g., N-vinyl pyrrolidone, etc.).
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, for a definition of the term "carboxylic acid or derivative" which defines "lactam"
- 284 Ethylenic reactant contains a chalcogen heterocycle:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a chalcogen heterocycle (chalcogen atom being O, S, Se, and Te).
- 285 Cyclic anhydride:**
This subclass is indented under subclass 284. Subject matter wherein the chalcogen heterocycle contains an anhydride group, e.g., maleic anhydride, etc.
- 286 Three-membered ring containing two carbon and one chalcogen atom:**
This subclass is indented under subclass 284. Subject matter wherein the chalcogen heterocycle consists of only two carbon atoms and one chalcogen atom (e.g., glycidyl methacrylate, etc.).
- 287 Ethylenic reactant contains a phosphorus atom:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a phosphorus atom, e.g., bis (beta-chloroethyl) vinyl phosphonate ($\text{CH}_2=\text{CH}-\text{P}(\text{O})(\text{OCH}_2\text{CH}_2\text{Cl})_2$), etc.
- 288 Ethylenic reactant contains atoms other than C, H, O, N, S, or Cl:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains an element other than C, H, O, N, S, or chlorine.
- 289 Ethylenic reactant contains a fused or bridged ring system:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a fused or bridged ring system (e.g., 5-ethylidene 2-norbornene, etc.).
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, for a definition of the term "fused or bridged ring system".
- 290 Dicyclopentadiene-containing group:**
This subclass is indented under subclass 289. Subject matter wherein the fused-ring system contains the dicyclopentadiene moiety.
- 291 Ethylenic reactant contains a sulfur atom:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains sulfur.
- 292 Ethylenic reactant contains a chlorine atom and is other than vinyl(idene) chloride:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains chlorine and is other than vinyl(idene) chloride, e.g., chloroprene, etc.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
317+, for solid polymer derived from vinyl or vinylidene chloride.
- 293 Ethylenic material contains a nitrogen atom and is other than (meth)acrylonitrile:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic material contains a nitrogen atom and is other than meth(acrylonitrile), e.g., dimethylaminoethyl acrylate, etc.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
242, for a solid polymer derived from methacrylonitrile or acrylonitrile.
- 294 Block copolymer derived from nitrogen-containing reactant:**
This subclass is indented under subclass 293. Subject matter wherein the polymer is a block copolymer derived from a nitrogen-containing reactant.

- (1) Note. This subclass does not provide for the grafting of a nitrogen-containing reactant onto a nonnitrogen containing block copolymer.

295 Nitrogen atom is part of a nitrile group and is other than acrylonitrile or (meth)acrylonitrile:

This subclass is indented under subclass 293. Subject matter wherein the nitrogen atom is part of a nitrile group and is other than (meth)acrylonitrile (e.g., vinylidene cyanide, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

242, for a solid polymer derived from methacrylonitrile or acrylonitrile.

296 Nitrogen atom is part of an amide group:

This subclass is indented under subclass 293. Subject matter wherein a nitrogen atom is part of a carboxylic acid amide group, e.g., acrylamide, etc.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, for a definition of the term "carboxylic acid amide" under "carboxylic acid or derivative".

297 Ethylenic reactant contains a cycloaliphatic group:

This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains a cycloaliphatic group, e.g., cyclopentene, etc.

298 Ethylenic reactant contains an oxygen atom:

This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains an oxygen atom (e.g., acrolein, etc.).

299 Block copolymer derived from oxygen-containing reactant:

This subclass is indented under subclass 298. Subject matter wherein the polymer is a block copolymer derived from an ethylenic reactant containing an oxygen atom.

- (1) Note. The product obtained by block copolymerizing methyl vinyl ketone-polystyrene is classified here. To be

proper for this subclass, the block copolymer must be derived from an unsaturated oxygen-containing reactant.

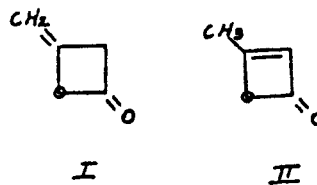
SEE OR SEARCH THIS CLASS, SUBCLASS:

300, for the product obtained by grafting polymethyl vinyl ketone (via methyl vinyl ketone as reactant) onto styrene-butadiene block copolymer.

300 Oxygen atom is part of a ketone or ketene group:

This subclass is indented under subclass 298. Subject matter wherein the oxygen atom is part of a ketone or ketene group, e.g., methyl vinyl ketone, etc.

- (1) Note. Ketene readily forms a dimer known as diketene. Chemical studies indicate that diketene is composed mainly of vinylaceto-B-lactone (I) and B-crotonalactone (II).



SEE OR SEARCH THIS CLASS, SUBCLASS:

284, for use of ketene dimer as a reactant.

301 Oxygen atom is part of a carboxylic acid group:

This subclass is indented under subclass 298. Subject matter wherein the oxygen atom is part of a carboxylic acid group (e.g., acrylic acid, etc.).

301.5 Unsaturated fatty acid derived from a naturally occurring glyceride, tall oil, or an unsaturated fatty acid derived from tall oil:

This subclass is indented under subclass 301. Subject matter wherein the carboxylic acid group containing ethylenic reactant is an unsaturated aliphatic acyclic monocarboxylic acid derived from a naturally occurring fatty glyceride or is derived from tall oil or is tall oil, per se.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
302+, for a fatty acid glycerol ester.
305, for systems wherein the ester containing at least two carboxylic acid groups is a naturally occurring di- or tri-glyceride, e.g., linseed oil, castor oil, etc.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, for a definition of the term "fatty acid" and the other materials proper for this subclass.
- 302 Oxygen atom is part of a carboxylic acid ester group:**
This subclass is indented under subclass 298. Subject matter wherein the oxygen atom is part of a carboxylic acid ester group, e.g., vinyl benzoate, etc.
- 303 Ester contains an oxygen atom other than as a carboxylic acid ester group:**
This subclass is indented under subclass 302. Subject matter wherein the carboxylic acid ester contains a noncarboxylic acid ester type oxygen atom (e.g., 2-hydroxyethyl acrylate diethyleneglycol di-acrylate ($\text{O}(\text{CH}_2\text{-OCOCH=CH}_2)_2$), etc.).
- 304 Ester contains at least two carboxylic acid ester groups:**
This subclass is indented under subclass 302. Subject matter wherein the carboxylic acid ester contains at least two carboxylic acid ester groups (e.g., dimethyl maleate, etc.).
- 305 Ester is derived from a polyol:**
This subclass is indented under subclass 304. Subject matter wherein the carboxylic acid ester is derived from a polyol, e.g., ethylene glycol diacrylate, etc.
- 306 Ester is derived from an unsaturated alcohol:**
This subclass is indented under subclass 304. Subject matter wherein the carboxylic acid ester is derived from an unsaturated alcohol (e.g., diallyl maleate, diallyl succinate, etc.).
- 307 Ester is derived from an unsaturated carboxylic acid and an unsaturated alcohol:**
This subclass is indented under subclass 302. Subject matter wherein the carboxylic acid ester is derived from an unsaturated carboxylic acid and an unsaturated alcohol (e.g., allyl methacrylate, etc.).
- 308 Ester is derived from an unsaturated carboxylic acid:**
This subclass is indented under subclass 302. Subject matter wherein the carboxylic acid ester is derived from an unsaturated carboxylic acid (e.g., methyl methacrylate, etc.).
- 309 Ester derived from an unsaturated carboxylic acid is reacted in the presence of a solid polymer:**
This subclass is indented under subclass 308. Subject matter wherein the unsaturated ester is reacted in the presence of a solid polymer.
- (1) Note. The ester may also be present in the solid polymer, but it must be present either as an unpolymerized reactant or as a liquid polymer, e.g., poly(styrene-methyl methacrylate) is treated with either butyl acrylate or liquid poly(methyl acrylate), etc.
- 310 Ester reactant derived from an unsaturated carboxylic acid is reacted in the presence of a solid polymer substrate derived from a polyene hydrocarbon:**
This subclass is indented under subclass 309. Subject matter wherein the solid polymer is derived from a plural unsaturated hydrocarbon reactant (e.g., grafting methyl acrylate onto solid poly(butadiene-styrene)).
- 311 Ester reactant derived from an unsaturated alcohol is reacted in the presence of a solid polymer:**
This subclass is indented under subclass 302. Subject matter wherein a carboxylic acid ester reactant derived from an unsaturated alcohol is reacted in the presence of a solid polymer (e.g., contacting poly(acrylonitrile-styrene) with vinyl acetate, etc.).

- 312 Oxygen atom is part of an ether group:**
This subclass is indented under subclass 298. Subject matter wherein the oxygen atom is part of an ether group (e.g., divinyl ether, etc.).
- 313 Ethylenic reactant contains at least two unsaturated groups and is devoid of an aromatic group:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant contains at least two unsaturated groups and is free of an aromatic group (e.g., mixing polyvinylchloride with butadiene, etc.).
- 314 Block copolymer derived from reactant containing at least two unsaturated groups and is free of an aromatic group:**
This subclass is indented under subclass 313. Subject matter wherein the polymer is a block copolymer derived from an ethylenic reactant containing at least two ethylenic groups which ethylenic reactant is free of an aromatic group, e.g., block copolymer of (polybutadiene-polypropylene).
- (1) Note. To be proper for this subclass the block copolymer itself must be derived from a necessary reactant for this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
313+, for a block copolymer derived from styrene and acrylonitrile with a nonaromatic plural unsaturated reactant.
- 315 Ethylenic reactant reacted in the presence of a solid polymer substrate derived from reactant containing two unsaturated groups and is devoid of an aromatic group:**
This subclass is indented under subclass 313. Subject matter wherein the initial solid polymer derived from a reactant containing at least two ethylenic groups and is free of an aromatic group and which solid polymer is reacted with an ethylenic reactant.
- 316 Ethylenic reactant is an aromatic hydrocarbon:**
This subclass is indented under subclass 315. Subject matter wherein the ethylenic reactants reacted with the solid polymer is an aromatic reactant, e.g., poly(butadiene-styrene) reacted with styrene, etc.
- 317 Ethylenic reactant is vinyl(idene) chloride:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant is vinyl chloride or vinylidene chloride.
- 318 Block copolymer derived from vinyl(idene) chloride:**
This subclass is indented under subclass 317. Subject matter wherein the polymer is a block copolymer derived from vinyl chloride or vinylidene chloride.
- (1) Note. To be proper for this subclass, the initial block copolymer must be derived from vinyl or vinylidene chloride.
- 319 Ethylenic reactant is acyclic hydrocarbon:**
This subclass is indented under subclass 242. Subject matter wherein the ethylenic reactant is an acyclic hydrocarbon.
- 320 Acyclic hydrocarbon contains five or more carbon atoms:**
This subclass is indented under subclass 319. Subject matter wherein the acyclic hydrocarbon contains at least five carbon atoms (e.g., 4-methyl-hexene-1, etc.).
- 321 Block copolymer derived from acyclic hydrocarbon containing five or more carbon atoms:**
This subclass is indented under subclass 320. Subject matter wherein the polymer is a block copolymer derived from an unsaturated acyclic reactant having at least five carbon atoms.
- (1) Note. To be proper for this subclass, the initial block copolymer must be derived from an acyclic hydrocarbon containing five or more carbon atoms.
- 322 Acyclic hydrocarbon is propylene:**
This subclass is indented under subclass 319. Subject matter wherein the acyclic hydrocarbon is propylene.
- 323 Block copolymer derived from propylene:**
This subclass is indented under subclass 322. Subject matter wherein the polymer is a block copolymer derived from propylene.

- (1) Note. To be proper for this subclass, the initial block copolymer must be derived from propylene.

324 Acyclic hydrocarbon is ethylene:

This subclass is indented under subclass 319. Subject matter wherein the acyclic reactant is ethylene.

326.1 Chemically after treated solid polymers derived from ethylenically unsaturated monomers only:

This subclass is indented under subclass 55. Product wherein a solid polymer solely derived from ethylenically unsaturated monomers has been chemically modified by a treatment in the presence of a chemical treating agent.

- (1) Note. See Lines With Other Classes and Within This Class, section II. B(4)(a) through II. B(4)(e) of the Class Definition for a discussion of classifying patents into this subclass and its indents vis-a-vis other areas.
- (2) Note. A material is presumed to be a rubber if it is described as an elastomer or if Mooney viscosity is given.

SEE OR SEARCH THIS CLASS, SUBCLASS:

337, through 388, for vulcanizable or cross-linkable compositions

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "chemical treating agent".

526, Synthetic Resins or Natural Rubbers, subclasses 78+ for process of adding material to the zone of an ongoing polymerization of ethylenically unsaturated monomers. Such added materials are often identified as chain stoppers, chain terminators or chain transfer agents.

326.2 Polymer derived from fluorine monomer:

This subclass is indented under subclass 326.1. Products wherein a solid polymer derived from a fluorine containing ethylenic unsaturated monomer has been chemically modified.

326.3 Vulcanized or crosslinked in presence of chemical treating agent:

This subclass is indented under subclass 326.2. Products wherein a chemical modification is described as vulcanization or cross-linking using a chemical treating agent.

- (1) Note. The terms curing or hardening are presumed to be synonymous with vulcanizing or cross-linking in the absence of disclosure to the contrary. For the instant subclass, any other language will be sufficient which shows that the chemical modification changes the system from thermoplastic (or soluble) to thermosetting (or insoluble). The term chain-extending is presumed not to express cross-linking in the absence of disclosure to the contrary.
- (2) Note. Vulcanizable compositions are not subject matter for this subclass unless prior to the vulcanization or cross-linking step there is present a chemically modified solid polymer derived from ethylenic monomers only.

SEE OR SEARCH THIS CLASS, SUBCLASS:

337, through 388, for vulcanizable or cross-linkable compositions.

326.4 Halogen containing chemical treating agent; or dehalogenated:

This subclass is indented under subclass 326.2. Product wherein a halogen containing treating agent is employed; or wherein a chemical treating agent is present during a step of removal of halogen.

326.5 Polymer derived from silicon monomer:

This subclass is indented under subclass 326.1. Product wherein a solid polymer derived from a silicon containing ethylenic unsaturated monomer has been chemically modified.

326.6 Polymer derived from monomer containing atom other than: C, H, N, O, S, halogen or group IA or IIA carboxylate:

This subclass is indented under subclass 326.1. Product wherein the solid polymer which has been chemically modified is derived from a monomer which contains an atom other than C,

H, N, O, S, halogen, or carboxylates of groups IA or IIA metals.

- (1) Note. Included herein are for example monomers which contain phosphorus, etc.

SEE OR SEARCH CLASS:

525, Synthetic Resins or Natural Rubbers, subclass 366 for the definition of Group IA and IIA metals.

326.7 Polymer derived from monomer containing nitrogen atom as part of a heterocyclic ring:

This subclass is indented under subclass 326.1. Product wherein a solid polymer which has been chemically modified is derived from a monomer which contains a nitrogen atom as part of a heterocyclic ring.

326.8 Oxygen atom in ring or bonded directly to the nuclear carbon of ring monomer:

This subclass is indented under subclass 326.7. Product wherein the heterocyclic monomer contains (1) an oxygen atom in the hetero ring, or (2) an oxygen atom directly attached to a nuclear carbon atom of the hetero ring.

326.9 Lactam monomer, e.g., vinyl pyrrolidone, etc:

This subclass is indented under subclass 326.8. Product wherein the heterocyclic monomer is a lactam.

SEE OR SEARCH CLASS:

520, Synthetic Resin or Natural Rubbers, Glossary, for the definition of the term "carboxylic acid or derivative" which defines "lactam".

327.1 6 membered ring containing 5 carbons and 1 nitrogen monomer, e.g., vinyl pyridine, etc.

This subclass is indented under subclass 326.7. Product wherein the heterocyclic monomer contains a 6 membered ring having 5 carbons and 1 nitrogen atom.

327.2 Polymer derived from monomer containing chalcogen as part of heterocyclic ring other than solely as cyclic anhydride of ethylenically unsaturated dicarboxylic acid:

This subclass is indented under subclass 326.1. Product wherein a solid polymer which has been chemically modified is derived from a monomer which contains chalcogen as part of a

heterocyclic ring and other than solely as a cyclic anhydride of an ethylenically unsaturated dicarboxylic acid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

327.4, for chemically modified solid polymers derived from cyclic anhydrides of ethylenic dicarboxylic acids.

327.3 Three membered chalcogen ring monomer, e.g., oxirane, etc.

This subclass is indented under subclass 327.2. Product wherein the heterocyclic monomer contains a three membered ring having two carbons and one chalcogen atom.

- (1) Note. Included herein is e.g., glycidyl acrylate, etc.

327.4 Polymer derived from carboxylic acid anhydride monomer:

This subclass is indented under subclass 326.1. Product wherein a solid polymer which has been chemically modified is derived from a monomer which has a carboxylic acid anhydride group.

SEE OR SEARCH CLASS:

520, Synthetic Resin or Natural Rubbers, Glossary, for the definition of the term "carboxylic acid anhydride" under "carboxylic acid or derivative".

327.5 Sulfur containing chemical treating agent:

This subclass is indented under subclass 327.4. Product wherein a sulfur containing chemical treating agent has been employed.

327.6 Nitrogen containing chemical treating agent other than unsubstituted ammonium as sole nitrogen:

This subclass is indented under subclass 327.4. Product wherein a nitrogen containing chemical treating agent other than an unsubstituted ammonium compound has been employed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

327.8, for use of unsubstituted ammonium compound as a hydrolyzing or neutralizing agent.

327.7 Esterified, i.e., preparation of COOR linkage:

This subclass is indented under subclass 327.4. Product wherein a chemical modification of the solid polymer is described as esterification.

- (1) Note. For purposes of this subclass, esterification denotes formation of a carboxylic acid ester group OR, e.g., lactone structure, etc.
- (2) Note. Reaction of carboxylic anhydride group with an alkylene oxide group is presumed to be esterification.

327.8 Hydrolyzed; neutralized; or metal containing chemical treating agent:

This subclass is indented under subclass 327.4. Product wherein a chemical modification of the solid polymer is described as hydrolysis or neutralization; or wherein a metal containing chemical treating agent has been employed.

- (1) Note. For purposes of this subclass, hydrolysis relates to addition of water to open the anhydride structure with formation of two carboxyl groups. In the absence of disclosure otherwise, treatment of anhydride with an aqueous system is presumed to result in a hydrolysis of the anhydride structure.
- (2) Note. For purposes of this subclass, neutralization relates to the reaction of an acid group, e.g., carboxyl, phosphonic, etc., with a base to form a salt. The bases include alkali, alkaline earth, or ammonium hydroxides.
- (3) Note. The metal containing chemical treating agent need only be present during a chemical modification step; included in this subclass, however, are systems wherein a metal atom becomes chemically bonded to the solid polymer. The chemical bond can be ionic or covalent in nature, or any of the "complex" bonding mechanisms as in pi (ii) bonding, coordination, etc.

327.9 Polymer for unsaturated petroleum hydrocarbon fraction as monomer:

Product under subclass 326.1 wherein a solid polymer which has been chemically modified is prepared by the polymerization of a mixture of hydrocarbons derived from a petroleum hydrocarbon fraction.

- (1) Note. This subclass includes chemically modified polymers wherein added material is interpolymerized with a petroleum hydrocarbon fraction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 327.2, for chemically modified interpolymer of coumarone and indene.
- 332.1, for a chemically modified polymer derived from a diene monomer wherein at least one monomer contains a fused or bridged ring or at least one cycloaliphatic structure.

SEE OR SEARCH CLASS:

- 526, Synthetic Resins or Natural Rubbers, subclass 290 for the polymerization of a mixture of hydrocarbons derived from a petroleum hydrocarbon fraction.

328.1 Polymer derived from acetylenic monomer:

This subclass is indented under subclass 326.1. Product wherein a solid polymer which has been chemically modified is derived from an acetylenic monomer.

328.2 Polymer derived from monomer containing nitrogen other than: unsubstituted ammonium, acrylonitrile, acrylamide, methyllolacrylamide, and the corresponding methacryl materials:

This subclass is indented under subclass 326.1. Product wherein the solid polymer which has been chemically modified is derived from a nitrogen containing monomer other than: NH_4^+ as sole nitrogen, acrylonitrile, acrylamide, methylol acrylamide, methacrylonitrile, methacrylamide and methylol methacrylamide.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 328.8, for methylol acrylamide or methylol methacrylamide polymers.

329.1+, for acrylonitrile or methacrylonitrile polymers.

329.4+, for acrylamide or methacrylamide polymers.

329.5+, and 329.9+, for polymers derived from NH_4^+ containing salt monomers.

328.3 At least one monomer containing two or more ethylenic groups:

This subclass is indented under subclass 328.2. Product wherein at least one monomer contains two or more ethylenic groups.

328.4 Monomer containing two or more nitrogen atoms, or two or more nitrogen containing monomers:

This subclass is indented under subclass 328.2. Product wherein a monomer contains two or more nitrogen atoms; or wherein there are two or more nitrogen containing monomers.

- (1) Note. The additional nitrogen containing monomer can be any ethylenic monomer which contains nitrogen, including those excluded from subclass 328.2.

328.5 Polymer derived from sulfur monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from a sulfur containing thylenic monomer.

328.6 Polymer derived from ketone monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from an ethylenically unsaturated ketone.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "ketone".

328.7 Polymer derived from aldehyde monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived an ethylenic monomer which is an aldehyde.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "aldehyde".

328.8 Polymer derived from alcohol monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from an ethylenically unsaturated monomer which contains an alcohol group.

- (1) Note. For purposes of this subclass, an alcohol group is defined as $-\text{C}-\text{OH}$ where the C is not directly double bonded to another chalcogen atom. Included herein are for example allyl alcohol or vinyl salicylate.

328.9 Polymer derived from ether monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from an ethylenically unsaturated ether monomer.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "ether".

329.1 Polymer derived from acrylonitrile or methacrylonitrile monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from acrylonitrile or methacrylonitrile monomer.

329.2 Interpolymers:

This subclass is indented under subclass 329.1. Product wherein the solid polymer is derived from an additional ethylenic monomer interpolymerized with the acrylonitrile or methacrylonitrile.

329.3 Contains monomer having two or more ethylenic groups:

This subclass is indented under subclass 329.2. Product wherein the solid interpolymer has been derived from at least one monomer containing two or more ethylenic groups.

329.4 Polymer derived from acrylamide or methacrylamide monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from acrylamide or methacrylamide monomer.

329.5 Polymer derived from carboxylic acid or derivative monomer other than: vinyl acetate; or acrylic or methacrylic acid, or derivatives:

This subclass is indented under subclass 326.1. Product wherein the solid polymer, which has been chemically modified, is obtained from an ethylenic monomer which is a carboxylic acid or derivative other than: vinyl acetate; or acrylic or methacrylic acid or derivatives.

SEE OR SEARCH THIS CLASS, SUBCLASS:

329.7+, and 330.3+, for chemically modified solid polymers based upon derivatives of acrylic or methacrylic acid, e.g., acrylyl chloride or ethyl acrylate, etc. and subclasses 330.3+ for polymers derived from vinyl acetate.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the term "carboxylic acid or derivative".

329.6 Butene dioic acid or derivative monomer:

This subclass is indented under subclass 329.5. Product wherein the carboxylic acid monomer is a butene dioic acid or derivative.

- (1) Note. For purposes of this subclass, butene dioic acid is defined as a dicarboxylic acid having only four carbon atoms and one ethylenic unsaturation.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of the terms "carboxylic acid or derivative" and "ethylenically unsaturated".

329.7 Polymer derived from acrylic or methacrylic acids, acid halides or salt monomers:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from acrylic or methacrylic

acids, acrylic or methacrylic acid halide or salt monomers thereof.

329.8 Sulfur or phosphorous containing chemical treating agent:

This subclass is indented under subclass 329.7. Product wherein a sulfur or phosphorous containing chemical treating agent has been employed.

329.9 Nitrogen containing chemical treating agent:

This subclass is indented under subclass 329.7. Product wherein a nitrogen containing chemical treating agent is employed.

330.1 Esterified, i.e., preparation of COOR linkage:

This subclass is indented under subclass 329.7. Product wherein a chemical modification of the solid polymer is described as esterification.

- (1) Note. For purposes of this subclass, esterification denotes formation of a carboxylic acid ester group OR.
- (2) Note. Reaction of carboxylic acid group with an alkylene oxide group is presumed to be esterification.
- (3) Note. Included herein is formation of e.g., lactone structures, etc.

330.2 Hydrolyzed; neutralized; or metal containing chemical treating agent:

This subclass is indented under subclass 329.7. Product wherein a chemical modification of the solid polymer is described as hydrolysis or neutralization; or wherein a metal containing chemical treating agent has been employed.

- (1) Note. For purposes of this subclass, hydrolysis relates to the addition of water to a carboxylic acid chloride or carboxylic acid ester to form a free carboxyl group.

Chemical treatment of acid chloride containing polymer with an aqueous system is presumed to be hydrolysis in absence of disclosure otherwise.

Chemical treatment of ester containing polymer with aqueous acid or base is

presumed to be hydrolysis in absence of disclosure otherwise.

- (2) Note. For purposes of this subclass, neutralization relates to reaction of an acid group (e.g., carboxyl, etc.) with a base to form a salt. The bases include alkali or alkaline earth hydroxides.
- (3) Note. The metal containing chemical treating agent need only be present during a chemical modification step; included in this subclass however, are systems wherein a metal atom becomes chemically bonded to the solid polymer. The chemical bond can be ionic or covalent in nature, or any of the "complex" bonding mechanisms as in ii (PI) bonding, coordination, etc.

330.3 Polymer derived from acrylic or methacrylic ester or vinyl acetate monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer is derived from ethylenically unsaturated carboxylic ester monomer (i.e., vinyl acetate; or acrylic or methacrylic esters).

330.4 Sulfur or phosphorus containing chemical treating agent:

This subclass is indented under subclass 330.3. Product wherein a sulfur or phosphorus containing chemical treating agent has been employed.

330.5 Nitrogen containing chemical treating agent:

This subclass is indented under subclass 330.3. Product wherein a nitrogen containing chemical treating agent has been employed.

330.6 Alcoholized; transesterified; hydrolyzed; or metal containing chemical treating agent; e.g., saponified, etc.:

This subclass is indented under subclass 330.3. Product wherein a chemical modification of the solid polymer is described as alcoholysis, transesterification, or hydrolysis; or wherein a metal containing chemical treating agent has been employed.

- (1) Note. For purposes of this subclass, alcoholysis relates to the reaction of an alco-

hol with a carboxylic acid ester to yield a new ester and alcohol.

- (2) Note. For purposes of this subclass transesterification or ester interchange relates to reaction of two esters to form two new esters by exchange of alcohol residues.
- (3) Note. For purposes of this subclass, hydrolysis relates to addition of water to an ester to form an alcohol and a carboxylic acid. This reaction can be either acid or base catalysed.
- (4) Note. Alkaline hydrolysis of an ester is called saponification.

330.7 Polymer derived from halogen monomer:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer has been derived from halogen containing ethylenically unsaturated monomer.

330.8 At least one monomer contains two or more ethylenic groups:

This subclass is indented under subclass 330.7. Product wherein at least one monomer contains two or more ethylenic groups.

- (1) Note. The monomer containing two or more double bonds need not contain halogen.

330.9 Vulcanized or crosslinked, in the presence of a chemical treating agent, e.g., cured, etc.:

This subclass is indented under subclass 330.8. Products wherein a chemical modification is described as vulcanization or cross-linking using a chemical treating agent.

- (1) Note. The terms curing or hardening are presumed to be synonymous with vulcanizing or cross-linking in the absence of disclosure to the contrary. For the instant subclass, any other language will be sufficient which shows that the chemical modification changes the system from thermoplastic (or soluble) to thermosetting (or insoluble). The term chain-extending is presumed not to express cross-linking in the absence of disclosure to the contrary.

- (2) Note. Vulcanizable compositions are not subject matter for this subclass unless prior to the vulcanization or cross-linking step there is present a chemically modified solid polymer derived from ethylenic monomers only.

SEE OR SEARCH THIS CLASS, SUBCLASS:

337, through 388, for vulcanizable or cross-linkable compositions.

331.1 Nitrogen containing chemical treating agent:

This subclass is indented under subclass 330.9. Product wherein a nitrogen containing material is present as chemical treating agent.

331.2 Halogen containing chemical treating agent:

This subclass is indented under subclass 330.8. Product wherein a halogen containing chemical treating agent has been employed.

331.3 Nitrogen containing chemical treating agent:

This subclass is indented under subclass 330.8. Product wherein a nitrogen containing chemical treating agent has been employed.

331.4 Monomer contains chlorine:

This subclass is indented under subclass 330.7. Product wherein at least one ethylenically unsaturated monomer contains chlorine.

331.5 Vinyl chloride or vinylidene chloride:

This subclass is indented under subclass 331.4. Product wherein the chlorine containing monomer is vinyl chloride or vinylidene chloride.

331.6 Halogen containing chemical treating agent:

This subclass is indented under subclass 331.5. Product wherein a halogen containing chemical treating agent has been employed.

331.7 Ethylene-propylene terpolymer, e.g., EPT, EPDM, EPR, etc.:

This subclass is indented under subclass 326.1. Product wherein the solid polymer which has been chemically modified is an ethylene-propylene terpolymer.

- (1) Note. An ethylene-propylene terpolymer has at least one monomer in addition to ethylene and propylene.

- (2) Note. Ethylene-propylene terpolymers are often described as ethylene-propylene terpolymer rubber (e.g., EPT OR EPDM rubber).

- (3) Note. Chemically modified material solely described as ethylene-propylene rubber (EPR) is placed herein as a terpolymer since a rubber is to be treated as a diene polymer in the absence of disclosure to the contrary

SEE OR SEARCH THIS CLASS, SUBCLASS:

333.1, for material solely described as a rubber or elastomer and presumed to be a diene rubber.

333.7, for chemically modified copolymer of ethylene with propylene.

331.8 Sulfur containing chemical treating agent:

This subclass is indented under subclass 331.7. Product wherein a sulfur containing chemical treating agent is employed.

331.9 Polymer derived from monomer containing at least two ethylenic groups or diene rubber:

This subclass is indented under subclass 326.1. Product wherein the solid polymer, which has been chemically modified, is either described as a diene rubber or is derived from a monomer which contains at least two ethylenic groups.

- (1) Note. A material is presumed to be a rubber if it is described as an elastomer or if a Mooney viscosity is given.

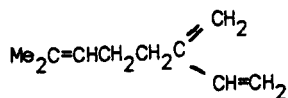
SEE OR SEARCH THIS CLASS, SUBCLASS:

333.1, for material solely described as a rubber or elastomer and presumed to be a diene rubber.

332.1 Monomer contains non-conjugated diene group, or at least one fused or bridged ring or at least one cycloaliphatic structure:

This subclass is indented under subclass 331.9. Product wherein said diene monomer contains nonconjugated ethylenic groups, or wherein at least one monomer contains a fused or bridged ring or a cycloaliphatic structure.

- (1) Note. Nonconjugated ethylenic groups denotes monomers wherein two or more ethylenically unsaturated groups are (a) separated from each other either by an aromatic ring (e.g., divinyl benzene) or (b) separated by at least one carbon atom of an acyclic carbon chain which carbon atom is not part of a methine group, e.g., $-C=C-C-C=C-$, etc; or (c) wherein two ethylenically unsaturated groups share a single carbon atom, etc., $C=C=C$
- (2) Note. Included herein are monomers containing ethylene groups which are both conjugated and nonconjugated, e.g., myrcene:



SEE OR SEARCH THIS CLASS, SUBCLASS:

333.3, for chemically after treated solid copolymers of aromatic hydrocarbon monomers with monomers containing a fused or bridged ring or a cycloaliphatic structure and only one ethylenic group.

332.2 Divinyl benzene:

This subclass is indented under subclass 332.1. Product wherein the nonconjugated ethylene monomer is divinyl benzene.

- (1) Note. Divinyl benzene is often described as a cross-linking agent for a base polymer, e.g., polystyrene cross-linked with divinyl benzene, etc. Such systems will be presumed to have been prepared by interpolymerization of, e.g., styrene

monomer with monomeric divinyl benzene in absence of specific disclosure that the divinyl benzene is reacted with the previously formed base polymer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

242+, for polymers derived from ethylenic reactants only mixed with ethylenic reactant.

332.3 Halogen containing chemical treating agent:

This subclass is indented under subclass 331.9. Product wherein a halogen containing chemical treating agent has been employed.

332.4 Sulfur containing chemical treating agent:

This subclass is indented under subclass 332.3. Product wherein a sulfur containing material is present as a chemical treating agent.

- (1) Note. Said sulfur containing material may be either a halogenating agent or an additional nonhalogen containing material.

332.5 Vulcanized in the presence of a chemical treating agent, e.g., cured, crosslinked, etc.:

This subclass is indented under subclass 331.9. Product wherein said solid polymer is vulcanized in the presence of a chemical treating agent.

- (1) Note. The terms curing or hardening are presumed to be synonymous with vulcanizing or cross-linking in absence of disclosure to the contrary. For the instant subclass, any other language will be sufficient which shows that the chemical modification changes the system from thermoplastic (or soluble) to thermosetting (or insoluble). The term chain-extending is presumed not to express cross-linking in absence of disclosure to contrary.

332.6 Sulfur containing chemical treating agent:

This subclass is indented under subclass 332.5. Product wherein a sulfur containing material is present as a chemical treating agent.

332.7 Nitrogen containing chemical treating agent:

This subclass is indented under subclass 332.6. Product wherein a nitrogen containing material is present as a chemical treating agent.

- (1) Note. The nitrogen atom can be present as a separate compound or as part of the sulfur containing material.

332.8 Interpolymer with aliphatic hydrocarbon monomer (includes additional diene monomer):

This subclass is indented under subclass 331.9. Product wherein said monomer containing at least two ethylenic groups is interpolymerized with an ethylenically unsaturated aliphatic hydrocarbon monomer.

- (1) Note. Included herein are interpolymers of two or more aliphatic diene monomers.

332.9 Interpolymer with aromatic hydrocarbon:

This subclass is indented under subclass 331.9. Product wherein said monomer containing at least two ethylenic groups is interpolymerized with an ethylenically unsaturated aromatic hydrocarbon monomer.

333.1 Isoprene or diene rubber other than butadiene rubber:

This subclass is indented under subclass 331.9. Product wherein the solid polymer which has been chemically modified is described as a diene rubber other than butadiene or is derived from isoprene monomer.

- (1) Note. For purposes of this subclass, materials nominally described as a rubber or elastomer are presumed to be a diene rubber other than butadiene.

SEE OR SEARCH THIS CLASS, SUBCLASS:

331.9, for a rubbery copolymer of Butadiene.
333.2, for a rubbery homopolymer of Butadiene.

333.2 Butadiene homopolymer:

This subclass is indented under subclass 332.1. Product wherein the sole monomer is butadiene (i.e., butadiene homopolymer).

333.3 Polymer derived from aromatic hydrocarbon monomer, e.g., styrene, etc.:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer has been derived from an ethylenically unsaturated aromatic hydrocarbon monomer.

333.4 Halogenated polymer:

This subclass is indented under subclass 333.3. Product wherein the said solid polymer has been halogenated.

- (1) Note. The halogen is introduced subsequent to formation of the solid polymer.
(2) Note. Halogen must be present in the final product.

SEE OR SEARCH THIS CLASS, SUBCLASS:

333.6, for quaternized polystyrene produced by reacting an amine with post halogenated polystyrene followed by reaction with quaternizing agent.

333.5 Sulfur containing chemical treating agent:

This subclass is indented under subclass 333.3. Product wherein a sulfur containing chemical treating agent has been employed.

333.6 Nitrogen containing chemical treating agent:

This subclass is indented under subclass 333.3. Product wherein a nitrogen containing chemical treating agent has been employed.

333.7 Polymer derived from acyclic hydrocarbon monomer only:

This subclass is indented under subclass 326.1. Product wherein the chemically modified solid polymer has been derived solely from an acyclic hydrocarbon monomer.

333.8 Air, elemental oxygen, ozone or peroxide chemical:

This subclass is indented under subclass 333.7. Product wherein air, elemental oxygen, ozone or a peroxide compound has been employed as a chemical treating agent.

- process and such compounds are therefore classified elsewhere in the schedule.
- 333.9 Sulfur containing chemical treating agent:**
This subclass is indented under subclass 333.7. Product wherein a sulfur containing chemical treating agent has been employed.
- 334.1 Halogenated polymer:**
This subclass is indented under subclass 333.7. Product wherein said solid polymer has been halogenated.
- (1) Note. The halogen is introduced subsequent to formation of the solid polymer.
- SEE OR SEARCH CLASS:
570, Organic Compounds, subclasses 101+, , for acyclic halogenated hydrocarbons, e.g., halogenated liquid polyisobutylene, etc.
- 337 Chemical treating agent contains boron or boron-containing compound other than boron trihalide or nonmetal complex thereof:**
This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of boron, per se, or in the presence of a boron-containing compound, said boron compound being other than (a) boron trihalide, per se, (b) or a boron trihalide complexed with a nonmetal organic moiety.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
55, for boron trihalide ether, per se.
385, for a boron trihalide ether complex.
- 338 Chemical treating agent contains elemental hydrogen or an elemental hydrogen-liberating compound, e.g., hydrogenation, etc.:**
Subject matter under subclass 55 wherein the chemical treating is performed in the presence of hydrogen or in the presence of a hydrogen liberating compound, e.g., hydrogenating, etc.
- (1) Note. The hydrogen liberating compound must under the anticipated process conditions, liberate elemental hydrogen.
- (2) Note. The ionization of hydrogen containing materials is not considered as being an elemental hydrogen liberating
- 339 Treating in the presence of an elemental metal or inorganic metallic compound:**
This subclass is indented under subclass 338. Subject matter wherein the chemical treating performed in the presence of an elemental metal or in the presence of an inorganic metal-containing compound.
- 340 Chemical treating agent contains a phosphorus atom:**
This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of a phosphorus or in the presence of a phosphorus-containing compound.
- 341 Contains a sulfur atom:**
This subclass is indented under subclass 340. Subject matter wherein the chemical treating is performed in the presence of a compound which contains at least one phosphorus atom and at least one sulfur atom.
- 342 Chemical treating agent contains a silicon atom:**
This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of silicon or in the presence of a silicon-containing compound.
- 343 Chemical treating agent contains a sulfur atom:**
This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of a sulfur-containing atom.
- 344 Inorganic sulfur compound contains sulfur atom bonded to at least two oxygen atoms:**
This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of an inorganic sulfur compound which contains at least one sulfur atom bonded to at least two oxygen atoms.
- 345 With peroxide, ozone, or free oxygen:**
This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of at least two materials, one of which is a sulfur-containing mate-

rial, and one of which is free oxygen, ozone, or a compound containing an -O-O- group.

- (1) Note. This subclass includes only those processes wherein there is a desired and intentional contact between air and the polymer to be treated.

346 With sulfur-free organic compound:

This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of at least two materials, one of which is a sulfur-containing material, and one of which is an organic compound which is devoid of sulfur atoms.

347 Sulfur-free organic compound contains a heterocyclic nitrogen:

This subclass is indented under subclass 346. Subject matter wherein the organic compound which is devoid of sulfur contains a nitrogen atom as a ring member of a heterocyclic ring compound.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "heterocyclic".

348 Sulfur-containing heterocyclic compound:

This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of a heterocyclic compound which contains at least one sulfur atom.

- (1) Note. The sulfur atom for purposes of this subclass need not be part of the heterocyclic ring system.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "heterocyclic".

349 Heterocyclic ring contains sulfur and nitrogen atoms:

This subclass is indented under subclass 348. Subject matter wherein a compound containing at least one sulfur atom and at least one nitrogen atom as ring members of a single heterocyclic ring is present during a chemical treating operation.

350 Mercaptan or mercaptide:

This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of a mercaptan or mercaptide thereof.

- (1) Note. A mercaptan denotes an organic compound having the general structure -C-SH wherein the carbon atom bound to the sulfur atom of the thiol group is not double bonded to oxygen, sulfur, selenium, or tellurium, or triple bonded to nitrogen.

- (2) Note. A mercaptide denotes a salt of a mercaptan.

351 Organic compound contains sulfur and nitrogen atoms:

This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of an organic compound which contains at least one sulfur atom and at least one nitrogen atom.

352 One or more sulfur atoms of the nitrogen-containing compound are double bonded to carbon:

This subclass is indented under subclass 351. Subject matter wherein the chemical treating is performed in the presence of an organic compound which contains at least one atom of sulfur and at least one nitrogen atom, with the proviso that at least one sulfur atom therein is double bonded to a carbon atom, i.e., .

353 Sulfur compound contains sulfur atom bonded to at least two oxygen atoms, e.g., sulfonate, etc.:

This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of a compound which has at least one sulfur atom bonded to at least two oxygen atoms, e.g., sulfonate, sulfate, etc.

354 Elemental sulfur or inorganic sulfur compound:

This subclass is indented under subclass 343. Subject matter wherein the chemical treating is performed in the presence of elemental sulfur or in the presence of an inorganic sulfur-containing compound.

- 355 Chemical treating agent contains hydrogen halide, elemental halogen, organic halogen-containing compound, or compound containing only halogen atoms:**
This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of a compound containing only hydrogen and halogen atoms, or in the presence of elemental halogen, or in the presence of an organic halogen-containing compound; or in the presence of a compound solely composed of diverse halogen atoms.
- 356 Treating in the presence of elemental halogen:**
This subclass is indented under subclass 355. Subject matter wherein the chemical treating is performed in the presence of elemental halogen.
- 357 Treating in the presence of a metal or metal containing compound:**
This subclass is indented under subclass 356. Subject matter wherein the chemical treating is performed in the presence of a metal or metal-containing compound.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "metal".
- 358 Treating in the presence of water:**
This subclass is indented under subclass 356. Subject matter wherein the chemical treating is performed in the presence of water.
- 359.1 Treating in the presence of organic halogen-containing compound:**
This subclass is indented under subclass 355. Subject matter wherein the chemical treating is performed in the presence of a halogen-containing organic compound.
- 359.2 Organic halogen-containing compound contains a hetero ring:**
This subclass is indented under subclass 359.1. Subject matter wherein the halogen-containing compound contains at least one nitrogen, sulfur, oxygen, selenium, or tellurium atom as part of a heterocyclic ring.
- 359.3 Organic halogen-containing compound contains oxygen:**
This subclass is indented under subclass 359.1. Subject matter wherein the halogen-containing compound contains at least one oxygen atom.
- 359.4 Organic halogen-containing compound contains a (C=O)O group or an aromatic group:**
This subclass is indented under subclass 359.3. Subject matter wherein said compound contains either a (C=O)O group or an aryl group.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
292, for a halogenated benzoquinone.
- 359.5 Organic halogen-containing compound contains only carbon, hydrogen, and halogen:**
This subclass is indented under subclass 359.1. Subject matter wherein the chemical-treating compound contains either carbon, hydrogen and halogen only, or carbon and halogen only.
- 359.6 Organic halogen-containing compound contains an aromatic group:**
This subclass is indented under subclass 359.5. Subject matter wherein said chemical-treating compound contains at least one aryl group.
- 360 Chemical treating agent contains elemental metal or metal-containing compound:**
This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of an elemental metal or in the presence of a compound containing a metal.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "metal".
- 361 Two or more diverse elemental metals or compounds thereof; or same metal in two or more distinct compounds; or diverse metals in same compound:**
This subclass is indented under subclass 360. Subject matter containing a compound which has two or more diverse metal atoms, or a mixture of two or more diverse elemental metals, or a mixture of the same or diverse metal atoms in two or more distinct compounds, or a mix-

- ture of an elemental metal and a metal compound.
- 362 Elemental metal or inorganic compound thereof only:**
This subclass is indented under subclass 361. Subject matter containing only elemental metals, or only inorganic metal compounds, or only an elemental metal and an inorganic metal compound.
- (1) Note. Compounds which are free of metal atoms are included herein when in admixture with elemental metals or inorganic metal compounds.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
361, for a mixture of a metal containing organic compound and an elemental metal or metal containing inorganic compound.
- 363 Aluminum or group IIB (Zn, Cd, Hg) metal or compound thereof:**
This subclass is indented under subclass 362. Subject matter containing aluminum or a Group IIB (Zn, Cd, Hg) elemental metal or inorganic compound thereof.
- 364 Organometallic compound and elemental metal or inorganic compound thereof:**
This subclass is indented under subclass 361. Subject matter containing at least one organometallic compound and at least an elemental metal or inorganic compound thereof.
- 365 Aluminum metal or compound thereof:**
This subclass is indented under subclass 364. Subject matter containing elemental aluminum or a compound thereof.
- (1) Note. The aluminum atom can be in the form of a free metal or in the form of an inorganic or organic compound.
- 366 Contains group IA (Li, Na, K, Rb, Cs, Fr) or group IIA (Be, Mg, Ca, Sr, Ba, Ra) elemental metal or compound thereof:**
This subclass is indented under subclass 360. Subject matter containing a Group IA (Li, Na, K, Rb, Cs, Fr) or Group IIA (Be, Mg, Ca, Sr, Ba, Ra) elemental metal or compound thereof.
- 367 Elemental metal or inorganic metal compound:**
This subclass is indented under subclass 366. Subject matter containing an elemental metal or an inorganic compound thereof.
- 368 Metal oxide:**
This subclass is indented under subclass 367. Subject matter containing a metal oxide.
- (1) Note. Oxides for this subclass are binary compounds consisting of only a metal atom and oxygen.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
361+, for an oxide containing two diverse metal atoms.
- 369 Metal hydroxide:**
This subclass is indented under subclass 367. Subject matter containing an inorganic metal hydroxide, i.e., Me+OH-.
- 370 Contains group IB (Cu, Ag, Au), IIB (Zn, Cd, Hg), IIIA (Al, Ga, In, Tl), IV (Ti, Zr, Hf, Ge, Sn, Pb), and VIII (Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt) elemental metal or compound thereof:**
This subclass is indented under subclass 360. Subject matter containing a Group IB (Cu, Ag, Au), IIB (Zn, Cd, Hg), IIIA (Al, Ga, In, Tl) IVB (Ti, Zr, Hf), IVA (Ge, Sn, Pb) or Group VIII (Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt) metal atom.
- 371 Elemental metal or inorganic compound thereof:**
This subclass is indented under subclass 370. Subject matter containing an elemental metal or inorganic compound thereof.
- 372 Metal oxide:**
This subclass is indented under subclass 371. Subject matter containing a metal oxide.
- (1) Note. Oxides for this subclass are binary compounds consisting of only a metal atom and oxygen.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
361+, for an oxide containing two diverse metal atoms.
- 373 Group IIB metal (Zn, Cd, Hg) oxide:**
This subclass is indented under subclass 372. Subject matter wherein the oxide is solely composed of a Group IIB (Zn, Cd, Hg) metal atom and oxygen.
- 374 Chemical treating agent is a nitrogen-containing compound:**
This subclass is indented under subclass 55. Subject matter under subclass wherein the chemical treating is performed in the presence of a nitrogen-containing compound.
- 375 Contains nitrogen atom in a heterocyclic ring:**
This subclass is indented under subclass 374. Subject matter wherein the chemical treating agent contains a compound having at least one atom of nitrogen and carbon in the same ring and wherein the other atoms of the ring may be oxygen, selenium, or tellurium.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
343+, for treating in the presence of a heterocyclic sulfur-containing compound.
- 376 Nitrogen-containing compound has at least one nitrogen-to-nitrogen bond:**
This subclass is indented under subclass 374. Subject matter wherein the nitrogen compound contains a nitrogen atom bonded to at least one atom of nitrogen (e.g., azo, hydrazine, N_2F_4 , etc.).
- 377 Nitrogen-containing compound contains at least one nitrile or isonitrile group; or a nitrogen-to-oxygen bond which is other than as an amine or ammonium salt:**
This subclass is indented under subclass 374. Subject matter wherein the chemical treating is performed in the presence of a compound containing a $-C=N$ or a $-N=C$ group, or wherein a nitrogen atom is directly bonded to an oxygen atom.
- 378 Ammonia, ammonium hydroxide, or salts thereof:**
This subclass is indented under subclass 374. Treatment wherein the nitrogen-containing compound is ammonia, ammonium hydroxide, or an organic or inorganic ammonium salt.
- 379 Organic amine:**
This subclass is indented under subclass 374. Treatment wherein the organic nitrogen compound contains an amine group.
- (1) Note. An amine denotes an organic compound having a nitrogen atom singly or double bonded to a carbon atom and wherein the carbon atom bonded to the nitrogen atom is devoid of a double bond to oxygen, sulfur, selenium, or tellurium or triple bond to nitrogen. In addition, those compounds wherein the same nitrogen atom is bonded to a () group (X is O, S, Se, or Te) and to a carbon atom which is not double-bonded to oxygen, sulfur, selenium, or tellurium, are not considered as being amines (e.g., $-C-NH-C(=X)-$). Although amides may be considered chemically as amines, it has been found expedient for these classes to exclude compounds containing only amide nitrogen herefrom. Therefore, as used throughout this area, the term amide is not to be confused with an amine. A compound, however, which contains a nitrogen atom bonded to a non carbon atom and which contains either a nitrogen atom bonded to a () group or an amide group, is considered as being an amine, e.g., $NH_2NH-CH_2-NH_2$, etc.
- 380 Amine contains a hydroxyl group:**
This subclass is indented under subclass 379. Subject matter wherein the amine compound contains a hydroxyl group.
- (1) Note. A hydroxyl group herein is that of an alcohol.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "alcohol".

381 Three or more amine groups:

This subclass is indented under subclass 379. Treatment wherein the amine compound contains three or more amine groups.

- (1) Note. An amine proper for this subclass requires (a) at least three distinct nitrogen atoms bonded to at least two distinct carbon atoms, or (b) the presence of at least three nitrogen atoms bonded to the same carbon atom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 379, (1) Note, for a discussion of what constitutes an “amine” in this area.

382 Two amine groups:

This subclass is indented under subclass 379. Treatment wherein the amine compound contains two amine groups.

- (1) Note. An amine proper for this subclass requires (a) at least two distinct nitrogen atoms bonded to at least two distinct carbon atoms, or (b) the presence of at least two nitrogen atoms bonded to the same carbon atom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 379, (1) Note, for a discussion of what constitutes an “amine” in this area.

383 Chemical treating agent contains elemental oxygen or oxygen-containing compound:

This subclass is indented under subclass 55. Subject matter wherein the chemical treating is performed in the presence of oxygen or in the presence of an oxygen containing compound.

384 Oxygen compound contains at least one alcohol group:

This subclass is indented under subclass 383. Subject matter wherein the chemical treating agent is an alcohol.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term “alcohol”.

385 Oxygen compound contains an ether group:

Subject matter under subclass 383 wherein the oxygen compound is an ether.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term “ether”.

386 Oxygen compound is a carboxylic acid, ester, anhydride, or lactone thereof:

This subclass is indented under subclass 383. Subject matter wherein the oxygen-containing compound is a carboxylic acid, ester thereof, anhydride thereof, or a lactone thereof.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of “carboxylic acid or derivative”, which defines the following terms: “carboxylic acid”, “carboxylic acid ester”, “anhydride”, and “lactone”.

387 Oxygen compound contains a peroxy group (-O-O-):

This subclass is indented under subclass 383. Subject matter wherein the oxygen-containing compound contains at least one oxygen atom bonded directly to another oxygen atom, i.e., -O-O-.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 388, for processes of treating in the presence of air, oxygen, or ozone.

388 Specified oxygen-containing compound is air, elemental oxygen, or ozone:

This subclass is indented under subclass 383. Subject matter wherein the oxygen-containing compound is identified as air, as elemental oxygen, or as ozone.

- (1) Note. This subclass includes only those processes wherein there is a desired and intentional contact between air and the polymer to be treated.

389 Solid polymer derived from reactant containing atoms other than C, H, N, Si, P, chal-

cogen, halogen, or an alkali or alkaline earth metal in salt form:

This subclass is indented under subclass 50. Subject matter involves the process of mixing a solid polymer derived from a reactant containing elements other than C, H, N, P, Si, chalcogen or halogen with an additional solid polymer, with specified polymer-forming ingredients, specified intermediate condensation product, chemical treating agent, or with an ethylenic agent; processes of reacting the above mixtures of products resulting from the mixing or reacting processes.

- (1) Note. Chalcogen is limited to oxygen, sulfur, selenium, or tellurium.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the terms "specified polymer-forming ingredients" or "specified intermediate condensation product".

390 Solid polymer derived solely from phenolic reactants wherein none of the reactants contains a plurality of methylol groups or derivatives thereof:

This subclass is indented under subclass 50. Subject matter involving processes of mixing a solid polymer derived from phenolics as sole reactants wherein none of the reactants forming the solid polymer contains a plurality of methylol groups or is a derivative thereof with an additional solid polymer, with specified polymer-forming ingredients, with a specified intermediate condensation product, chemical treating agent, or with an ethylenic agent; or processes of forming or reacting, or the resultant products of any of the above mixtures.

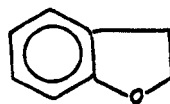
- (1) Note. This subclass includes solid polymers prepared from a multiplicity of phenolic reactants.
- (2) Note. The term "phenolic reactant" is limited to phenols, phenol ether, and phenolate salt.

(a)A phenol for purposes of this subclass requires one or more -OH groups directly bonded to a nuclear carbon atom of a substituted or unsubstituted benzene ring, which benzene ring can be an indi-

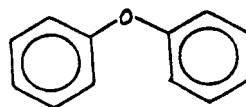
vidual benzene ring or can be part of a polycyclic ring system.

(b)A phenol ether for purposes of this subclass requires one or more -O-C groups wherein the oxygen atom of the -O-C group is directly bonded to a nuclear carbon atom of a substituted or unsubstituted benzene ring and wherein the carbon atom of the -O-C group is not double-bonded to oxygen, sulfur, selenium, or tellurium or triple-bonded to nitrogen. The benzene ring may be an individual benzene ring or may be part of a polycyclic ring system. The following examples of phenol ether are within the definition set out above.

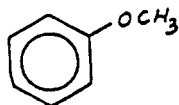
- (1)The -O-C group may itself be part of a cyclic ring system, e.g.,

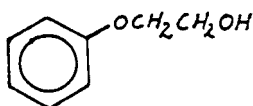


- (2)The carbon of the -O-C group may be a ring atom of a cyclic or aromatic ring, e.g.,



- (3)The carbon of the -O-C group may be a terminal carbon atom, e.g., as in the first illustration below, or may be the carbon atom of a chain, e.g., as in the second illustration, below.





(c) An inorganic phenolate salt is an inorganic salt of a phenol see (phenol (1) Note) above wherein the hydrogen atom of an -OH group is replaced by a metal or an inorganic group.

SEE OR SEARCH THIS CLASS, SUBCLASS:

480+, for solid polymers derived from a phenolic reactant containing a plurality of methylol groups from a derivative thereof.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms "specified polymer-forming ingredients", "specified intermediate condensation product", and "methylol or methylol derivative".

391 Mixed with ethylenically unsaturated reactant or polymer derived therefrom:

This subclass is indented under subclass 390. Subject matter wherein the solid phenolic polymer is mixed with an ethylenically unsaturated agent or polymer derived therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

132+, for a solid polymer from a phenolic reactant admixed or reacted with a solid polymer derived from ethylenic reactants only.

392 Unsaturated aromatic reactant or polymer thereof:

This subclass is indented under subclass 391. Subject matter wherein an unsaturated reactant or polymer derived therefrom contains an aromatic group.

393 Mixed with silicon-containing reactant or polymer derived therefrom:

Subject matter under subclass 390 wherein the solid phenolic polymer is mixed with a silicon-

containing reactant or polymer derived therefrom.

394 Mixed with -OO-, halO-, or halhal reactant or polymer derived therefrom:

This subclass is indented under subclass 390. Subject matter wherein the solid phenolic polymer is mixed with a -OO-, halO, or halhal-containing reactant or polymer thereof.

395 Mixed with -N=C=X-containing reactant or polymer therefrom (X is chalcogen):

This subclass is indented under subclass 390. Subject matter wherein the solid phenolic polymer is mixed with a -N=C=X or blocked -N=C=X-containing reactant or polymer derived therefrom (X is a chalcogen).

(1) Note. Blocking a -N=C=X (masked, hidden, etc.) is utilized to render the -N=C=X group inert by conversion to an inactive group. The process of reactivation usually involves merely heating so as to revert the blocked reactant to a -N=C=X-containing reactant. The usual mode of rendering the -N=C=X reactant inert is to convert it to the form of a NO-group.

396 Mixed with 1, 2-epoxy containing reactant or polymer therefrom, or wherein polymer contains at least one 1, 2-epoxy group:

This subclass is indented under subclass 390. Subject matter wherein the solid phenolic polymer is mixed with a 1, 2-epoxy group-containing reactant or polymer derived therefrom, or wherein a polymer contains at least one 1, 2-epoxy group.

397 Mixed with carboxylic acid or derivative reactant or polymer derived therefrom:

This subclass is indented under subclass 390. Subject matter wherein the solid phenolic polymer is mixed with a carboxylic acid or derivative or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "carboxylic acid or derivative".

398 Solid polymer derived from aldehyde, aldehyde derivative, or low molecular weight polymer thereof as sole reactant and

wherein none of the reactants contains a plurality of methylol groups or derivatives thereof:

This subclass is indented under subclass 50. Subject matter involves processes of mixing solid polymer derived from an aldehyde, aldehyde derivative, or low molecular weight polymers thereof as sole reactants wherein none of the reactants contains plural methylol groups or is a derivative thereof, with an additional solid polymer, with specified polymer-forming ingredients, with a specified intermediate condensation product, with a chemical treating agent or with ethylenic agent; processes of reacting these mixtures or products resulting from the mixing or reacting processes.

- (1) Note. This subclass includes homo- or copolymers of only aldehyde or aldehyde derivative reactants.
- (2) Note. This subclass includes solid polymers prepared from a multiplicity of aldehyde or aldehyde derivative reactants.
- (3) Note. An aldehyde derivative for purposes of this subclass includes:
 - (a) Compounds having $X-CH_2OH$ group wherein X is other than carbon or hydrogen. Included herein are paraformaldehyde, methylol derivative of urea, etc.
 - (b) Heterocyclic compounds having only carbon and oxygen as ring atoms in an alternating manner and in equal amount, i.e., $(O-)_n$. Included herein is trioxane.
 - (c) Hexamethylenetetramine or derivative e.g., as illustrated below; a derivative of this type requires the basic ring structure of hexamethylenetetramine but wherein the hydrogen atoms may have been replaced by other atoms.



- (4) Note. Compounds having a methylol group ($-CH_2OH$) bonded to atoms other than carbon, oxygen, or hydrogen are regarded for this subclass as being a mixture of two compounds one of which is formaldehyde. For instance, a methylol derivative of melamine is regarded as being a mixture of melamine and formaldehyde. Methylol urea is regarded as being a mixture of formaldehyde and urea.
- (5) Note. Solid paraformaldehyde polymers will be regarded as monomeric formaldehyde.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition the terms "methylol", "methylol derivative", "aldehyde", "specified polymer-forming ingredients", or "specified intermediate condensation product".
- 526, Synthetic Resins or Natural Rubbers, subclass 315 for a polymer derived from an ethylenically unsaturated aldehyde as sole reactant or for an interpolymer derived from only ethylenically unsaturated reactants wherein at least one of the ethylenically unsaturated reactants contains an aldehyde group.
- 528, Synthetic Resins or Natural Rubbers, subclass 403 for heterocyclic oxygen-containing reactants such as dioxolane, dioxepan, etc.; and subclasses 480+ for processes of treating a polymer not involving a chemical modification of the polymer, by the addition of a material thereto, and for chemically modifying material other than the polymer. Subclasses 480+ also provide for processes of admixing with a broadly claimed nonreactant material.

399 Mixed with $-N=C=X$ -containing reactant or polymer derived therefrom (X is chalcogen):

This subclass is indented under subclass 398. Subject matter wherein a solid polymer derived from an aldehyde or aldehyde derivative is mixed with $-N=C=X$ or blocked $-N=C=X$ reac-

tant or polymer derived therefrom (X is chalcogen).

SEE OR SEARCH THIS CLASS, SUBCLASS:

395, for a discussion of the term "blocked".

400 Mixed with carboxylic acid or derivative reactant or polymer derived therefrom:

This subclass is indented under subclass 398. Subject matter wherein a solid polymer derived from an aldehyde or aldehyde derivative is mixed with a carboxylic acid or derivative reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition for a definition of the term "carboxylic acid or derivative".

401 Mixed with ethylenically unsaturated reactant or polymer derived therefrom:

This subclass is indented under subclass 398. Subject matter wherein a solid polymer derived from an aldehyde or derivative is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.

402 Solid polymer derived from aldehyde or derivative containing halogen:

This subclass is indented under subclass 398. Subject matter wherein the solid polymer is derived from an aldehyde or aldehyde derivative which contains halogen.

403 Solid polymer derived from 1,2-epoxy compound containing only one 1,2-epoxy group as sole reactant and wherein none of the reactants contains a plurality of methylol groups or derivatives thereof:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived only from 1,2-epoxy compounds all of which contains only a single 1,2-epoxy group and none of which contains a plurality of methylol or methylol derivative groups with an additional solid polymer with specified polymer-forming ingredients, with a specified intermediate condensation product, with a chemical treating agent or with an ethylenic reactant; processes of reacting the above mixtures; or products resulting from the mixing

or reacting processes (e.g., polyepihalohydrin, ethylene oxide-epihalohydrin copolymer, etc.).

(1) Note. This subclass includes solid polymers prepared from a multiplicity of reactants all of which contain a single 1,2-epoxy group.

(2) Note. Excluded from this subclass are any 1,2-epoxy reactants which contain a plurality of methylol or methylol derivative groups. See the Glossary for the definition of "methylol derivative".

(3) Note. This subclass includes homo- or co-polymers of only 1,2-epoxy reactants containing a single 1,2-epoxy group.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, subclass 273 for homopolymers of glycidyl acrylate.

404 Mixed with ethylenically unsaturated reactant or polymer therefrom:

This subclass is indented under subclass 403. Subject matter wherein the solid polymer derived from 1,2-epoxy reactants only containing a single 1,2-epoxy group is mixed with an ethylenically unsaturated reactant or polymer thereof.

405 Mixed with aldehyde or aldehyde derivative reactant or polymer therefrom:

This subclass is indented under subclass 403. Subject matter wherein the solid polymer derived from 1,2-epoxy reactants only containing a single 1,2-epoxy group is mixed with an aldehyde or aldehyde derivative reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, for a definition of the term "aldehyde" or "aldehyde derivative".

406 Contains amine-, N, or N-containing reactant (X is chalcogen):

This subclass is indented under subclass 405. Subject matter which also contains an amine-, N, or N-S containing reactant (X is chalcogen).

(1) Note. The amine-, N, or N-S- containing reactant need not be added simulta-

neously with the aldehyde or aldehyde derivative reactant.

407 Mixed with 1,2-epoxy reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 403. Subject matter wherein the solid polymer derived from 1,2-epoxy reactant only containing a single 1,2-epoxy group is mixed with an epoxy reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

408 Mixed with carboxylic acid or derivative or polymer derived therefrom:

This subclass is indented under subclass 403. Subject matter wherein the solid polymer derived from 1,2-epoxy reactants only containing a single 1,2-epoxy group is mixed with a carboxylic acid or derivative reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, for a definition of the term "carboxylic acid or derivative".

409 Solid polymer derived only from 1,2-epoxy reactants containing only C, H, and O:

This subclass is indented under subclass 403. Subject matter wherein the solid polymer is derived from only 1,2-epoxy reactants which contain only carbon, hydrogen, and oxygen atoms (e.g., ethylene oxide-propylene oxide copolymer, ethylene oxide-glycidyl methacrylate copolymer, etc.).

410 Solid polymer derived from hetero-O-cyclic compounds as sole reactant wherein at least one reactant contains a hetero-O-ring other than solely as a 1,2-epoxy or anhydride, and wherein none of the reactants contains a plurality of methylol groups or derivative thereof:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from only hetero-O-cyclic reactants and wherein at least one reactant thereof contains a hetero-O-ring other than solely as a 1,2-epoxy or anhydride and wherein none of the reactants contain a plurality of methylol groups or is a derivative thereof with additional solid polymer, specified polymer-

forming ingredients, specified intermediate condensation product, chemical treating agent or ethylenic agent; processes of reacting the above mixtures; or products resulting from the mixing or reacting processes, e.g., dioxane homopolymers, trioxane-ethylene oxide copolymers, etc.

(1) Note. Cyclic anhydrides and 1,2-epoxy groups are not considered as being hetero-O-cyclic and proper for this subclass. When these groups are present, however, there must be an additional hetero-O-ring present. This additional ring may be part of the 1,2-epoxy or anhydride group-containing compound or it may be a separate compound which is devoid of 1,2-epoxy or anhydride ring.

(2) Note. This subclass includes homo- or co-polymers of only hetero-O-cyclic compounds.

411 Mixed with carboxylic acid or derivative reactant or polymer therefrom:

This subclass is indented under subclass 410. Subject matter wherein the solid polymer derived from only hetero-O-cyclic reactant is mixed with a carboxylic acid or derivative reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, for a definition of the term "carboxylic acid or derivative".

412 Mixed with unsaturated reactant or polymer therefrom:

This subclass is indented under subclass 410. Subject matter wherein solid polymer derived from only hetero-O-cyclic reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.

413 Mixed with -OO- or halreactant or polymer derived therefrom:

This subclass is indented under subclass 410. Subject matter wherein the solid polymer derived from only hetero-O-cyclic reactant is mixed with a -OO- or hal reactant or polymer derived therefrom.

414 Mixed with aldehyde or aldehyde derivative or polymer derived therefrom:

This subclass is indented under subclass 410. Subject matter wherein the solid polymer derived from only hetero-O-cyclic reactant is mixed with an aldehyde or aldehyde derivative reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, for a definition of the terms “aldehyde” and “aldehyde derivative”.

415 Solid polymer derived from carboxylic acid cyclic ester, e.g., lactone, etc.:

This subclass is indented under subclass 410. Subject matter wherein the solid polymer is derived from only hetero-O-cyclic reactants which is derived from a carboxylic acid ester, i.e., $-(O)_n-O-$ (n is one or more and is part of a heterocyclic ring and the carbon atom single-bonded to the oxygen atom of the $-(O)_n-O-$ group is not double bonded to oxygen, sulfur, selenium, tellurium, or triple-bonded to nitrogen).

416 Solid polymer derived from hydrocarbon or halogenated hydrocarbon as sole reactant or mixture thereof:

This subclass is indented under subclass 50. Subject matter involves processes of mixing solid polymer derived from only hydrocarbons or halogenated hydrocarbon reactants or mixtures thereof with additional solid polymer, with specified polymer-forming ingredients, with specified intermediate condensation product, with chemical treating agent, or with ethylenic agent; processes or products resulting from the above mixing processes.

- (1) Note. This subclass provides for a solid copolymer derived from hydrocarbons and halogenated hydrocarbons (e.g., dichlorobenzene-xylene copolymers, etc.) or for solid polymers derived from only hydrocarbons or halogenated hydrocarbons.

417 Solid polymer derived from heterocyclic materials as sole reactants wherein each of the heterocyclic materials contains a hetero ring other than solely as a lactam, 1,2-epoxy or carboxylic acid anhydride and wherein**none of the reactants contains a plurality of methylol groups or derivatives thereof:**

This subclass is indented under subclass 50. Subject matter involving processes of mixing a solid polymer derived from heterocyclic materials as sole reactants other than solely as a lactam, 1,2-epoxy, or carboxylic acid anhydride, with an additional solid polymer and wherein none of the heterocyclic materials contains a plurality of methylol groups or derivatives thereof, with specified intermediate condensation product, with specified polymer-forming ingredients, with chemical treating agent or with ethylenic agent; processes or products resulting from the mixing processes (e.g., polyepisulfide, polyethylenimine, etc.).

- (1) Note. This subclass does not regard a lactam, 1,2-epoxy group, or cyclic carboxylic acid anhydride as being heterocyclic and, therefore, when these groups are present must be part of a compound which contains a heterocyclic group proper for this subclass.
- (2) Note. Excluded from this subclass are any heterocyclic reactants which contain a plurality of methylol groups or derivatives thereof and see the Glossary and subclass 398 for a definition of the terms “methylol” and “methylol derivative”.

SEE OR SEARCH THIS CLASS, SUBCLASS:

509+, for methylolated melamine since this is not considered a single reactant but a mixture of two reactants, namely, melamine and formaldehyde.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, for a definition of the term “carboxylic acid or derivative” which defines “lactum”.

418 Solid polymer derived from at least one carboxylic acid or derivative:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from at least one carboxylic acid or derivative with additional solid polymer, with specified polymer-forming ingredients, with an intermediate condensation

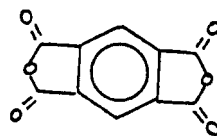
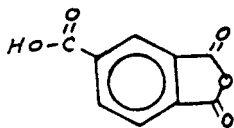
product, chemical treating agent or with ethylenic agent; processes of reacting the above mixtures or products resulting from the above processes.

(1) Note. A derivative of a carboxylic acid is limited to a nitrile, ester, anhydride, salt, amide, imide, lactam, lactone, and acyl halide.

(2) Note. In carboxylic acids and their derivatives, certain compounds may have more than one function, e.g., a lactone is a species of esters, a lactam is a species of an amide. Compounds which are multifunctional are classified on the basis of the first appearing function provided in the subclass hierarchy.

(3) Note. A polycarboxylic acid reactant for purposes of this subclass requires the presence of at least two carboxylic acid groups. A polycarboxylic derivative requires at least one carboxylic acid group and at least one carboxylic acid derivative, or at least two identical carboxylic acid derivatives, or at least two different carboxylic acid derivatives.

(4) Note. For purposes of this subclass an anhydride having the general formula, $-C_n-O-C-C-$, which may be linear or cyclic, is considered as being a polycarboxylic acid. A compound having both an anhydride and a free carboxylic acid is considered as being a tricarboxylic acid, e.g., as in the first illustration below, and a compound containing two anhydride groups is considered as being a tetracarboxylic acid, e.g., as in the second illustration, below.



(5) Note. An imide is considered as being a dicarboxylic acid derivative.

(6) Note. An organic amine salt of a carboxylic acid has been classified as if it were a mixture of an amine and a carboxylic acid. An organic diamine salt of a dicarboxylic acid where the amine salt-forming groups are identical is considered as being a single amine compound, whereas if the amine groups are different then they are regarded as two amine compounds. Where the compound contains two or more nitrogen atoms bonded to the same or different noncarbonyl carbon atom then they are to be regarded as polyamines.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for the definition of "amine" and for a further elucidation of "carboxylic acid or derivative".
- 528, Synthetic Resins or Natural Rubbers, subclass 263, for an explanation of the term "polyamine".

419 Solid polymer derived from at least one lactam; from an amino carboxylic acid or derivative; or from a polycarboxylic acid or derivative:

This subclass is indented under subclass 418. Subject matter wherein the solid polymer derived from a carboxylic acid or derivative, is derived from at least one lactam, from an amino carboxylic acid or derivative, or from a polycarboxylic acid or derivative.

420 Solid polymer derived from an amino carboxylic acid or derivative; from a polyamine and a polycarboxylic acid or derivative from at least one lactam; or from a polyamine salt of a polycarboxylic acid:

This subclass is indented under subclass 419. Subject matter wherein the solid polymer is derived from amino carboxylic acid or derivative, from a polyamine reactant and a polycar-

boxylic acid reactant or derivative, from at least one lactam reactant, or from a polyamine salt of a polycarboxylic acid.

420.5 Solid polymer derived from a polycarboxylic acid which is a dimer or trimer of an aliphatic acyclic monocarboxylic acid having at least ten carbon atoms or adducts of unsaturated aliphatic acyclic monocarboxylic acids, having ten carbon atoms with an alpha, beta ethylenically unsaturated carboxylic acid or derivative:

This subclass is indented under subclass 420. Subject matter wherein the solid polymer is derived from a polycarboxylic acid which is a dimer or trimer of an aliphatic acyclic monocarboxylic acid having at least ten carbon atoms or an adduct of an unsaturated aliphatic acyclic monocarboxylic acids, having ten carbon atoms with an alpha, beta ethylenically unsaturated carboxylic acid or derivative.

- (1) Note. Hydrogenated forms of the dimer and trimer acids are included herein.
- (2) Note. The solid polymer containing the dimer, trimer, or adduct polycarboxylic acid need not be the solid polymer described in this subclass.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, for the definition of "dimer or trimer of an aliphatic carboxylic acid".
- 528, Synthetic Resins or Natural Rubbers, subclass 339.5 for polyamides from, e.g., dimer acid, adipic acid and a polyamine, etc.
- 562, Organic Compounds, subclass 509 for adducts of fatty acids with alpha, beta ethylenically unsaturated dicarboxylic acids and for the dimer or trimer, per se.
- 564, Organic Compounds, subclasses 152+ for polyamides, per se, produced from dimer acid and polyamines.

421 Solid polymer derived from reactant containing ethylenic unsaturation:

This subclass is indented under subclass 420. Subject matter wherein the solid polymer is derived from a reactant containing ethylenic unsaturation.

- (1) Note. The ethylenically unsaturated reactant may be the carboxylic acid or may be an additional reactant, e.g., maleic anhydride, 1,4-diaminobutene-2, etc.

422 Solid polymer derived from imide reactant:
This subclass is indented under subclass 421. Subject matter wherein the solid polymer is derived from an imide reactant.

423 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

424 Mixed with -N=C=X reactant or polymer derived therefrom (X is chalcogen):

This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with an -N=C=X or blocked -N=C=X reactant or polymer derived therefrom (X is chalcogen).

SEE OR SEARCH THIS CLASS, SUBCLASS:

395, for a discussion of the term "blocked".

425 Mixed with polycarboxylic acid or derivative and polyhydroxy reactant or polymer therefrom:

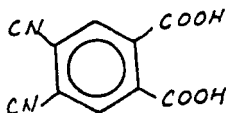
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with a polycarboxylic acid or derivative reactant and a polyhydroxy reactant or reaction product resulting therefrom.

- (1) Note. It is unnecessary for the polycarboxylic acid and polyhydroxy reactant to be added to the solid polymer simultaneously. The only requirement is that both reactants be added to the solid polymer sometime during the mixing and/or reacting processes.

- 426 Mixed with ethylenically unsaturated reactant or polymer therefrom:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.
- 427 Mixed with aldehyde or aldehyde derivative reactant or polymer therefrom:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with an aldehyde or aldehyde derivative reactant or polymer derived therefrom.
- (1) Note. Hexamethylenetetramine is regarded for this subclass as an aldehyde derivative and not as an amine reactant. Reactions therewith are in this subclass.
- 428 Contains amine, N-C-, N-S-containing reactant or polymer thereof (X is chalcogen):**
This subclass is indented under subclass 427. Subject matter which contains an amine, N, N-containing reactant (X is chalcogen) which is not in the solid polymer backbone or a polymer thereof.
- (1) Note. The amine, N or N- containing reactant can be part of, or in addition to, the aldehyde or aldehyde derivative reactant.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "phenolic reactant".
- 429 Contains phenolic reactant or polymer thereof:**
This subclass is indented under subclass 427. Subject matter which contains a phenolic reactant (which is not in the solid polymer backbone) or a polymer thereof.
- (1) Note. The phenolic reactant or polymer thereof can be in addition to the aldehyde or aldehyde derivative or can be in the same compound. See the Glossary for a definition of the term "phenolic".
- 430 Mixed with a reactant containing a single 1,2-epoxy group per mole or polymer derived therefrom:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with a reactant containing only one 1,2-epoxy group per mole or polymer derived therefrom.
- 431 Mixed with silicon reactant or polymer derived therefrom:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with a silicon-containing reactant or polymer derived therefrom.
- 432 Mixed with additional polycarboxylic acid and a polyamine; amino carboxylic acid or derivative; polyamine salt of a polycarboxylic acid; lactam; or polymer derived therefrom:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with a polycarboxylic acid and a polyamine, with an amino carboxylic acid, with a polyamine salt of a polycarboxylic acid, with a lactam, or with a polymer of the materials derived above.
- 433 Mixed with OO, hal, or halhal reactant or polymer derived therefrom:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer is mixed with a -OO, hal-C, or halhal reactant or polymer derived therefrom.
- 434 Solid polymer derived from hydroxyl group-containing reactant:**
This subclass is indented under subclass 420. Subject matter wherein the solid polymer derived from an amino carboxylic acid, from a polyamine reactant and a polycarboxylic acid or derivative, from at least one lactam reactant, or from a polyamine salt of a polycarboxylic acid, is also derived from a hydroxy-containing reactant.
- 435 Solid polymer derived from compound containing more than two amine groups:**
This subclass is indented under subclass 420. Subject matter wherein solid polymer is derived from a compound containing more than a two amine groups.

436 Solid polymer derived from compound containing more than two carboxylic acid groups or derivatives thereof:

This subclass is indented under subclass 420. Subject matter wherein the solid polymer is derived from a compound containing more than two carboxylic acid groups or from a derivative of a carboxylic acid, e.g.,



437 Solid polymer derived from polyhydroxy reactant and polycarboxylic acid or derivative reactant; or derived from di- or higher ester of a polycarboxylic acid as sole reactant:

This subclass is indented under subclass 419. Subject matter wherein the solid polymer is derived from a polyhydroxy reactant and a polycarboxylic acid or derivative reactant; or from a di- or higher ester of a polycarboxylic acid as sole reactant.

438 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from a polycarboxylic acid or derivative reactant and a polyhydroxy reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

439 Mixed with -OO, hal, or halhal reactant or polymer derived therefrom; or wherein solid polymer is derived from ahalhal, -OO-, or halO-, a polycarboxylic acid or derivative and a polyhydroxy reactant:

This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from a polycarboxylic acid or derivative and a polyhydroxy reactant or from a di- or higher ester of polycarboxylic acid as sole reactant is mixed with -OO-, hal, halhal-containing reactant or polymer thereof; or wherein

the solid polymer is derived from a polycarboxylic acid or derivative, a polyhydroxy reactant and a -OO, hal, halhal-containing reactant.

440 Mixed with -N=C=X reactant or polymer derived therefrom (X is chalcogen); or wherein solid polymer is derived from a -N=C=X reactant and also a polycarboxylic acid or derivative and a polyhydroxy reactant:

This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from polycarboxylic acid or derivative reactant and polyhydroxy reactant or from a di- or a higher ester or a polycarboxylic acid as sole reactant is mixed with -N=C=X or blocked N=C=X reactant or polymer derived therefrom; or wherein the solid polymer is derived from a polycarboxylic acid or derivative reactant, a polyhydroxy reactant, and a -N=C=X or blocked N=C=X reactant (X is chalcogen).

- (1) Note. This subclass takes solid polyol, polycarboxylic acid derived from polyester mixed with isocyanate reactant as well as solid polymer derived from polyol, polycarboxylic acid and diisocyanate mixed with a chemical treating agent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

395, for a discussion of the term "blocked".

441 Mixed with aldehyde or aldehyde derivative reactant or polymer derived therefrom:

This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from polycarboxylic acid or derivative reactant and polyhydroxy reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant is mixed with an aldehyde or aldehyde derivative reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms "aldehyde" and "aldehyde derivative".

442 Contains phenolic reactant or polymer thereof:

This subclass is indented under subclass 441. Subject matter which contains a phenolic reactant which is not in the solid polymer backbone or a polymer thereof.

- (1) Note. This subclass includes, for example, a mixture of a solid polymer derived from a polyhydroxy reactant and a polycarboxylic acid reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant with either a phenolic reactant or polymer thereof and an aldehyde or aldehyde derivative or polymer thereof or a reaction product of a phenolic reactant and an aldehyde or aldehyde derivative or wherein the phenolic moiety is in the same compound as is the aldehyde moiety.

443 Contains an amine-, N-C-, or N-S- containing reactant or polymer thereof (X is chalcogen):

This subclass is indented under subclass 441. Subject matter which contains an amine-, N, or N- containing reactant (X is chalcogen) or polymer thereof.

- (1) Note. This subclass includes, for example, a mixture of a solid polymer derived from a polyhydroxy reactant and a polycarboxylic acid reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant with an amine-, C- or N- containing reactant or solid polymer thereof and an aldehyde or aldehyde derivative or polymer thereof; or the reaction product of an amine-, C-, or N- containing reactant with an aldehyde or aldehyde derivative.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 441, for reactions with hexamethylenetetramine which is regarded therein as an aldehyde derivative.

444 Mixed with polycarboxylic acid or derivative and polyhydroxy reactant or polymer thereof:

This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from a polycarboxylic acid or derivative reactant and a polyhydroxy reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant is mixed with an additional polycarboxylic acid or derivative reactant and a polyhydroxy reactant or reaction product thereof.

- (1) Note. This subclass provides for blends of two or more solid polycarboxylic acid-polyhydroxy compound polyesters as well as a solid polyester and polycarboxylic acid and a polyhydroxy compound.

444.5 Solid polymer derived from or system contains a reactant which is a fatty acid glycerol ester, a fatty acid or salt derived from a naturally occurring glyceride, tall oil, or fatty acid derived from tall oil:

This subclass is indented under subclass 444. Subject matter wherein (a) a solid polymer is derived from a reactant which is a fatty acid glycerol ester, a fatty acid or salt thereof derived from a naturally occurring glyceride, tall oil, or fatty acid derived from tall oil; or (b) wherein the system contains a reactant noted in (a) above as a separate reactant or as an additional reactant with the polycarboxylic acid derivative and polyhydroxy reactant or polymer thereof.

SEE OR SEARCH CLASS:

- 520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fatty acid" and of other materials proper for this subclass.

445 Mixed with ethylenically unsaturated reactant or polymer therefrom:

This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from a polycarboxylic acid or derivative and polyhydroxy reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.

- 446 Mixed with silicon-containing reactant or polymer derived therefrom:**
This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from polycarboxylic acid or derivative reactant and polyhydroxy reactant or from a di- or higher ester of a polycarboxylic acid as sole reactant is mixed with a silicon-containing reactant or polymer derived therefrom.
- 447 Solid polymer derived from polycarboxylic acid or derivative and a polyhydroxy compound derived from reactant containing ethylenic unsaturation:**
This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from a polycarboxylic acid or derivative reactant, polyhydroxy, or additional reactant is derived from a reactant containing ethylenic unsaturation.
- (1) Note. The ethylenic unsaturation may be present in the polycarboxylic acid or derivative reactant, the polyhydroxy reactant, or an additional reactant.
- 448 Solid polymer derived from polycarboxylic acid or derivative and polyhydroxy compound is derived from two or more polycarboxylic acids or derivatives:**
This subclass is indented under subclass 437. Subject matter wherein the solid polymer derived from a polycarboxylic acid or derivative reactant and polyhydroxy reactant is derived from two or more polycarboxylic acids or derivatives as reactants.
- 449 Mixed with 1,2-epoxy reactant or polymer derived therefrom:**
This subclass is indented under subclass 419. Subject matter wherein solid polymer derived from a polycarboxylic acid or derivative is mixed with 1,2-epoxy reactant or polymer derived therefrom.
- 450 Solid polymer derived from hydroxy-containing carboxylic acid or derivative reactant:**
This subclass is indented under subclass 418. Subject matter wherein the solid polymer is derived from a hydroxyl-containing carboxylic acid or derivative reactant, e.g., lactic acid, etc.
- 451 Solid polymer derived from carboxylic acid or derivative derived from ethylenically unsaturated reactant:**
This subclass is indented under subclass 418. Subject matter wherein a solid polymer derived from a carboxylic acid or derivative is derived from an ethylenically unsaturated reactant.
- (1) Note. The unsaturation can be in the carboxylic acid or in an additional reactant.
- 452 Solid polymer derived from $-N=C=X$ reactant (X is chalcogen):**
This subclass is indented under subclass 50. Subject matter involving processes of mixing a solid polymer derived from a $-N=C=X$ or blocked $-N=C=X$ reactant with an additional solid polymer, with specified polymer-forming ingredients, or with a specified intermediate condensation product, chemical treating agent, or with an ethylenic agent; processes or products resulting from the above mixing processes (X is chalcogen).
- SEE OR SEARCH THIS CLASS, SUBCLASS:
395, for a discussion of the term "blocked".
- 453 Solid polymer derived from $-N=C=X$ reactant and polyhydroxy reactant:**
This subclass is indented under subclass 452. Subject matter wherein the solid polymer derived from a $N=C=X$ or blocked $N=C=X$ reactant is also derived from a polyhydroxy reactant.
- 454 Mixed with carboxylic acid or derivative reactant or polymer derived therefrom; or with heterocyclic reactant containing more than one heterocyclic ring; or polymer therefrom:**
This subclass is indented under subclass 453. Subject matter wherein a solid polymer derived from a $-N=C=X$ or blocked $-N=C=X$ reactant and polyhydroxy reactant is mixed with a carboxylic acid or derivative reactant or polymer derived therefrom, or with a heterocyclic reactant containing more than one heterocyclic ring or polymer thereof, e.g., polyurethanes mixed with a carboxylic acid reactant, etc.

- 455 Mixed with ethylenically unsaturated reactant or polymer therefrom:**
This subclass is indented under subclass 453. Subject matter wherein a solid polymer derived from a $-N=C=X$ reactant and polyhydroxy reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.
- 456 Mixed with aldehyde or aldehyde derivative reactant or polymer therefrom:**
This subclass is indented under subclass 453. Subject matter wherein a solid polymer derived from a $N=C=X$ or blocked $N=C=X$ reactant and polyhydroxy reactant is mixed with an aldehyde or aldehyde derivative reactant or polymer derived therefrom.
- 457 Mixed with $-N=C=X$ reactant or polymer therefrom:**
This subclass is indented under subclass 453. Subject matter wherein a solid polymer derived from $-N=C=X$ or blocked $-N=C=X$ reactant and polyhydroxy reactant is mixed with a $-N=C=X$ or blocked $-N=C=X$ reactant or polymer derived therefrom (X is chalcogen).
- 458 Contains polyhydroxy reactant; or additional polymer derived from $-N=C=X$ and polyhydroxy reactant:**
This subclass is indented under subclass 457. Subject matter which contains a solid polymer derived from a $-N=C=X$ reactant and polyhydroxy reactant and additional reactants at least one of which is a $-N=C=X$ or blocked $-N=C=X$ or blocked $-N=C=X$ reactant and at least one of which is polyhydroxy reactant or a polymer thereof.
- (1) Note. This subclass includes blends of solid polyurethanes, a solid polyurethane with a nonsolid polyurethane and a solid polyurethane with a polyisocyanate and a polyhydroxy reactant.
- 459 Solid polymer derived from $-N=C=X$ reactant and polyhydroxy reactant also derived from polyamine reactant:**
This subclass is indented under subclass 453. Subject matter wherein the solid polymer derived from a $-N=C=X$ or blocked $-N=C=X$ reactant and polyhydroxy reactant is also derived from a polyamine reactant (X is chalcogen).
- 460 Solid polymer derived from $-N=C=X$ reactant and polyhydroxy reactant derived from polyhydroxy reactant containing an ether group:**
This subclass is indented under subclass 453. Subject matter wherein the solid polymer is derived from a $-N=C=X$ or blocked $-N=C=X$ reactant and from a polyhydroxy reactant containing an ether group (X is chalcogen), e.g., solid polyurethane formed from polyisocyanate and liquid hydroxy-terminated polyalkylene oxide, etc.
- 461 Solid polymer derived from $-OO-$ or hal-containing reactant:**
This subclass is indented under subclass 50. Subject matter involving processes of mixing solid polymer derived from $-OO-$ or hal reactant with additional solid polymer, specified polymer-forming ingredients, specified intermediate condensation product, chemical treating agent, or ethylenic agent; processes of reacting the above mixtures or products resulting from the above processes.
- 462 Solid polymer derived from $-OO-$ or hal-C containing reactant and polyhydroxy reactant:**
This subclass is indented under subclass 461. Subject matter wherein the solid polymer is derived from $-OO-$ or hal-C- reactant and a polyhydroxy reactant.
- 463 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from $-OO-$ or hal reactant and polyhydroxy reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.
- 464 Mixed with silicon-containing reactant or polymer derived therefrom:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from $-OO-$ or hal reactant and polyhydroxy reactant is mixed with a silicon-containing reactant or polymer derived therefrom.

- 465 Mixed with aldehyde or aldehyde derivative reactant or reaction product therefrom:**
This subclass is indented under subclass 462. Subject matter wherein solid polymer derived from -OO- or hal containing reactant and polyhydroxy reactant is mixed with an aldehyde or aldehyde derivative reactant or polymer derived therefrom.
- 466 Mixed with polycarboxylic acid or derivative and polyhydroxy reactants or polymer thereof; or di- or higher ester of polycarboxylic acid as sole reactant or polymer therefrom:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from -OO- or hal reactant and polyhydroxy reactant is mixed with a polycarboxylic acid or derivative reactant and a polyhydroxy reactant or polymer derived therefrom; or mixed with a polymer derived from a di- or higher ester of a polycarboxylic acid as a sole reactant.
- 467 Mixed with nitrogen-containing reactant or polymer therefrom:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from -OO- or hal reactant and polyhydroxy reactant is mixed with a nitrogen-containing reactant or polymer derived therefrom.
- 468 Mixed with ethylenically unsaturated reactant or polymer therefrom:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from -OO- or hal reactant and polyhydroxy reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.
- 469 Solid polymer derived from -OO- or hal and polyhydroxy reactant derived from at least two polyhydroxy reactants:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from -OO- or hal reactant and polyhydroxy reactant is derived from at least two polyhydroxy reactants.
- 470 Solid polymer derived from -OO- or hal reactant and polyhydroxy reactant contains an atom other than C, H, O, or halogen bonded to a -C- group:**
This subclass is indented under subclass 462. Subject matter wherein a solid polymer derived from -OO- or hal reactant and a polyhydroxy reactant is derived from a reactant containing an atom other than C, H, or O or other than a reactant containing a halogen atom wherein the halogen atoms are solely bonded to a carbonyl group, i.e., .
- 471 Solid polymer derived from ketone reactant and wherein none of the reactants forming the solid polymer contains an aldehyde group or is an aldehyde-type reactant or polymer derived therefrom:**
This subclass is indented under subclass 50. Subject matter involving processes of mixing a solid polymer derived from a ketone reactant and wherein none of the reactants forming the solid polymer is an aldehyde or aldehyde-type reactant or polymer derived therefrom, with an additional solid polymer, with a chemical treating agent, with specified polymer-forming ingredients, specified intermediate condensation product, or with ethylenic agent; processes of forming or reacting the above mixtures, or products resulting from the above processes.
- SEE OR SEARCH CLASS:
520, Synthetic Resins or Natural Rubbers, for a definition of the term "ketone" and "aldehyde-type".
- 472 Solid polymer derived from aldehyde or aldehyde-type reactant and wherein none of the reactants forming the solid polymer contains a phenol, amine-, -N-, -N-, or ketone group or a condensate thereof except when an amine group appears in hexamethylenetetramine or a derivative thereof (X is chalcogen):**
This subclass is indented under subclass 50. Subject matter involving processes of mixing a solid polymer derived from an aldehyde or aldehyde-type reactant and wherein none of the reactants forming the solid polymer contains a phenol, amine, ketone group, or is a polymer thereof other than wherein the amine group is hexamethylenetetramine or a derivative thereof, with additional solid polymer, with specified polymer-forming ingredients, with specified intermediate condensation products, with chemical treating agent, or with ethylenic

agent; processes of reacting or forming the above mixtures, or products resulting from the above processes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

398, the Notes therein, for a discussion of “aldehyde-type”.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms “aldehyde” and “aldehyde derivative”.

- 473 Solid polymer derived from aldehyde or aldehyde-type reactant containing atoms other than C, H, or O and, wherein when hexamethylenetetramine or derivative is a reactant, there is additionally present a reactant containing atoms other than C, H, or O:**

This subclass is indented under subclass 472. Subject matter wherein a solid polymer derived from aldehyde or aldehyde-type reactant contains atoms other than carbon, hydrogen, an oxygen and, when hexamethylenetetramine or derivative thereof is a reactant, there is additionally present a reactant containing atoms other than carbon, hydrogen, and oxygen.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term “aldehyde-type”.

- 474 Solid polymer derived from silicon-containing reactant:**

This subclass is indented under subclass 50. Subject matter involving processes of mixing solid polymer derived from a silicon-containing reactant, with additional solid polymer, with specified polymer-forming ingredients, with specified intermediate condensation product, with chemical treating agent, or with ethylenic agent; processes of forming or reacting the above mixtures or products resulting from the above processes.

- 475 Mixed with aluminum- or heavy metal-containing reactant or polymer therefrom:**

This subclass is indented under subclass 474. Subject matter wherein a solid polymer derived from a silicon-containing reactant is mixed

with an aluminum- or a heavy metal-containing reactant or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term “aldehyde-type”.

- 476 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:**

This subclass is indented under subclass 474. Subject matter wherein a solid polymer derived from a silicon-containing reactant is mixed with a reactant containing more than 1,2-epoxy group per mole or polymer derived therefrom.

- 477 Mixed with silicon-containing reactant or polymer therefrom:**

This subclass is indented under subclass 474. Subject matter wherein a solid polymer derived from a silicon-containing reactant is mixed with a silicon-containing reactant or polymer derived therefrom.

- 478 Wherein one of said silicon materials contains Si-H bond:**

This subclass is indented under subclass 477. Subject matter wherein at least one of the silicon-containing materials contains Si-H bond.

(1) Note. In this subclass, the Si-H bond may be present in either the solid silicon polymer or the silicon-containing reactant or polymer.

- 479 Mixed with ethylenically unsaturated reactant or polymer derived therefrom:**

This subclass is indented under subclass 474. Subject matter wherein a solid polymer derived from a silicon reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.

- 480 Solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant or polymer therefrom:**

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or

aldehyde-type reactant or polymer thereof, with an additional solid polymer, with an additional specified intermediate condensation product, with specified polymer-forming ingredients, or with ethylenic agent; processes of mixing solid polymer derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant or polymer thereof with a chemical treating agent; processes of forming or reacting the above mixtures, or products resulting from the above processes.

- (1) Note. When a nonsolid specified intermediate condensation product is involved, the chemical treating agent must be a solid polymer, a specified intermediate condensation product, or part of a specified polymer-forming ingredient system or be an ethylenic agent.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for definitions of the terms “specified polymer-forming ingredients”, “specified intermediate condensation product”, “aldehyde-type reactant”, and “chemical treating agent”.

481 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

496, for the reaction of a phenolic-aldehyde polymer and reactant containing a single 1,2-epoxy group.

482 Phenolic-aldehyde or phenolic-aldehyde-type reaction product modified with 1,2-monoepoxide prior to mixing with reactant

containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 481. Subject matter wherein the solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant or polymer therefrom, is modified by reaction with a 1,2-monoepoxide prior to mixing said material with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

483 Contains sulfur-containing reactant or polymer therefrom:

This subclass is indented under subclass 482. Subject matter wherein sulfur is present either as a reactant or as part of the solid polymer or specified intermediate condensation product.

484 Contains nitrogen reactant or polymer therefrom:

This subclass is indented under subclass 482. Subject matter wherein nitrogen is present either as a reactant or as part of the solid polymer or solid intermediate condensation product.

485 With specified material:

This subclass is indented under subclass 481. Subject matter wherein a specified material is present in the mixture.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, for a definition of the term “specified material”.

486 Specified material contains nitrogen:

This subclass is indented under subclass 485. Subject matter wherein the specified material contains a nitrogen atom.

487 With silicon-containing reactant or polymer derived therefrom:

This subclass is indented under subclass 481. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom, is also mixed with an addi-

tional silicon-containing reactant or polymer derived therefrom.

488 With carboxylic acid or derivative reactant or polymer derived therefrom:

This subclass is indented under subclass 481. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom is further mixed with a carboxylic acid or derivative reactant or polymer derived therefrom.

489 With additional aldehyde or aldehyde-type reactant or polymer therefrom which is distinct from aldehyde or aldehyde-type reactant used in forming solid polymer or specified intermediate condensation product or with nitrogen-containing reactant:

This subclass is indented under subclass 481. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom is also mixed with an additional aldehyde or aldehyde-type reactant or polymer reactant derived therefrom which is distinct from the aldehyde in the solid or specified intermediate condensation product; or with a nitrogen-containing reactant or polymer derived therefrom.

490 Wherein phenolic-aldehyde or phenolic-aldehyde-type solid polymer or specified intermediate condensation product contains nitrogen or ethylenic unsaturation:

This subclass is indented under subclass 481. Subject matter wherein a solid polymer or specified intermediate condensation product is derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant and which contains or is derived from a nitrogen or ethylenically unsaturated material.

491 Mixed with additional aldehyde or aldehyde-type reactants which are part of a

specified polymer-forming ingredient system or polymer thereof:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with an additional aldehyde or aldehyde-type polymer, specified intermediate condensation product, or aldehyde or aldehyde-type reactants which are part of a specified polymer-forming ingredient system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503, for a mixture of a solid polymer derived from a phenolic reactant and an aldehyde or aldehyde-type reactant with an aldehyde treating agent which treating agent is not an aldehyde condensate nor a mixture of specified polymer-forming ingredients, e.g., a mixture of a solid phenol-aldehyde polymer and paraformaldehyde, etc.

492 Additional material is a hydrocarbon-aldehyde- or hydrocarbon-aldehyde-type polymer, condensate, or reactants therefrom:

This subclass is indented under subclass 491. Subject matter wherein the additional aldehyde material is a hydrocarbon-aldehyde or hydrocarbon-aldehyde-type polymer, condensate, or reactants.

493 Additional material is ketone-aldehyde- or ketone-aldehyde-type polymer, condensate, or reactants thereof:

This subclass is indented under subclass 491. Subject matter wherein the additional aldehyde or aldehyde-type material, condensate, or reactants is a ketone-aldehyde- or aldehyde-type polymer, condensate, or reactants.

494 Contains nitrogen-containing reactants or polymer therefrom:

This subclass is indented under subclass 493. Subject matter which contains a nitrogen-containing reactant or polymer.

(1) Note. In this subclass, the nature of the nitrogen is insignificant in that it may be either a part of the polymer, specified polymer-forming reactant system, or an independent material.

495 Additional material is amine-, N-C- or N-S-containing reactant -aldehyde or -aldehyde derivative polymer, condensate, or reactants therefrom (X is chalcogen):

This subclass is indented under subclass 491. Subject matter wherein the additional material is an amine and/N or N- containing reactant aldehyde or aldehyde-type polymer, condensate, or reactants (X is chalcogen).

496 Contains 1,2-epoxy-containing reactant or polymer derived therefrom:

This subclass is indented under subclass 495. Subject matter which contains a reactant containing a single 1,2-epoxy group or polymer derived therefrom.

497 Heterocyclic nitrogen reactant or polymer therefrom, e.g., melamine, etc.:

This subclass is indented under subclass 495. Subject matter which contains a hetero-N-cyclic reactant or polymer derived therefrom, e.g., melamine, etc.

498 NN-containing reactant or polymer, e.g., urea, etc. (X is chalcogen):

This subclass is indented under subclass 495. Subject matter which contains a NN reactant or polymer derived therefrom (X is chalcogen) e.g., urea, etc.

499 Contains sulfur reactant or polymer therefrom:

This subclass is indented under subclass 495. Subject matter which contains a sulfur-containing reactant or polymer derived therefrom.

- (1) Note. In this subclass, the sulfur may be present either as part of the phenolic-aldehyde or aldehyde-type polymer or condensate, as part of the amine or N aldehyde or aldehyde-type polymer or condensate, or as a separate reactant or as a chemical treating agent.

500 Wherein the phenolic-aldehyde- or phenolic-aldehyde-type solid polymer or specified intermediate condensation product is derived from a reactant or polymer containing an atom other than C, H, or O:

This subclass is indented under subclass 491. Subject matter wherein the phenol-aldehyde or aldehyde-type solid polymer or specified inter-

mediate condensate is derived from a reactant or polymer containing an atom other than carbon, hydrogen, or oxygen.

501 Additional phenol-aldehyde- or -aldehyde-type polymers, condensation product or reactants therefrom:

This subclass is indented under subclass 491. Subject matter wherein the additional aldehyde or aldehyde-type reactant polymer, condensate, or reactants is a phenolic-aldehyde or an aldehyde-type polymer condensate or reactants.

- (1) Note. This subclass provides, for example, for mixtures of two solid phenol-aldehyde polymers, a solid phenol-aldehyde polymer with either a phenol-aldehyde specified intermediate condensation product or phenol and an aldehyde, or a phenol-aldehyde specified intermediate condensation product with a phenol and an aldehyde.

501.5 Mixed with reactant which is a fatty acid glycerol ester, a fatty acid or salt derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil; or the reaction product of any of the above with a polycarboxylic acid or ester forming derivative and a polyhydroxy compound:

This subclass is indented under subclass 480. Subject matter wherein there is at least one reactant which is a fatty acid glyceride, a fatty acid or salt thereof derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil, or a reaction product of any of these materials with a polycarboxylic acid or ester and a polyol.

- (1) Note. The so-called drying or semidrying oil modified phenolic resins are placed herein if an unsaturated fatty acid or oil is added to a solid polymer or pre-formed SICP.
- (2) Note. Dehydrated castor oil fatty acids are included herein as fatty acids derived from a naturally occurring glyceride.
- (3) Note. See Lines With Other Classes and Within This Class, section II, B(5) for a discussion of the lines between this subclass and other areas.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fatty acid" and of other materials proper for this subclass.

502 Mixed with unsaturated reactant or polymer derived therefrom:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from a phenolic reactant and an aldehyde or aldehyde-type reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.

503 Mixed with aldehyde or aldehyde-type chemical treating agent:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or an aldehyde-type reactant is mixed with an aldehyde or aldehyde-type treating agent.

- (1) Note. This subclass takes, as an example, a mixture of a solid phenol-aldehyde polymer and a chemical treating agent, such as a catalyst, as well as a mixture of a resinifiable phenol-aldehyde intermediate condensate with polymer-forming ingredients (necessary for this subclass).

SEE OR SEARCH CLASS:

528, Synthetic Resins or Natural Rubbers, subclasses 129+ for a mixture of a specified intermediate condensation product of phenol and an aldehyde with a nonsolid specified treating agent such as an aldehyde-containing material.

504 Mixed with nitrogen-containing chemical treating agent:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and an aldehyde or aldehyde-type reactant is mixed with a nitrogen-containing chemical treating agent or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "chemical treating agent".

505 Mixed with sulfur-containing chemical treating agent:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product with at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with a sulfur-containing chemical treating agent or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "chemical treating agent".

506 Mixed with a boron- or polyvalent metal-containing chemical treating agent:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with a boron- or polyvalent metal-containing chemical treating agent or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "chemical treating agent".

507 Mixed with an 1,2-epoxy-containing chemical treating agent:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with 1,2-epoxy-containing chemical treating agent or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "chemical treating agent".

508 Mixed with carboxylic acid- or derivative-containing chemical treating agent:

This subclass is indented under subclass 480. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one phenolic reactant and at least one aldehyde or aldehyde-type reactant is mixed with a carboxylic acid or derivative chemical treating agent or polymer derived therefrom.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "chemical treating agent".

509 Solid polymer or specified intermediate condensation product derived from at least one amine-, N or N- containing reactant and at least one aldehyde or aldehyde-type reactant (X is chalcogen):

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer or specified intermediate condensation product derived from at least one amine and/N or N- containing reactant and at least one aldehyde or aldehyde-type reactant or polymer thereof with an additional solid polymer, with additional specified intermediate condensation product, with specified polymer-forming ingredients or with ethylenic agent; processes of mixing solid polymer derived from at least one amine and/N or N- containing reactant and at least one aldehyde or aldehyde-type reactant or polymer thereof with a chemical treating agent; or products resulting from the above mixing processes (X is chalcogen).

- (1) Note. In this and the indented subclasses, an amine and/N-C- or O N-S-aldehyde, or aldehyde-type condensate must be a solid in order for a mixture thereof and a chemical treating agent to be classified herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

480, the Note, for further elucidation.

SEE OR SEARCH CLASS:

528, Synthetic Resins or Natural Rubbers, for a mixture of a nonsolid condensation product of an amine and/N or N-

containing reactant and an aldehyde with a chemical treating agent, e.g., a catalyst, etc.

510 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 509. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one amine and/N(X)-, or N- containing reactant and at least one aldehyde or aldehyde-type reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

511 With specified material:

This subclass is indented under subclass 510. Subject matter which further contains a specified material.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "specified material".

512 Amine-, N or N- containing reactant (X is chalcogen), aldehyde or aldehyde-type condensation product or polymer thereof contains atoms other than C, H, O, N or S:

This subclass is indented under subclass 510. Subject matter wherein the amine and/N or N-containing reactant-aldehyde, -aldehyde-type solid polymer or specified intermediate condensation product contains an atom other than carbon, hydrogen, oxygen, nitrogen, or sulfur.

513 With sulfur-containing reactant or polymer therefrom:

This subclass is indented under subclass 510. Subject matter which also contains a sulfur-containing reactant or polymer derived therefrom.

- (1) Note. In this subclass, the sulfur-containing reactant or polymer derived therefrom must be an ingredient separate and distinct from the two required ingredients, i.e., the aminoplast or the 1,2-epoxy material.

- 514 With carboxylic acid or derivative reactant or polymer derived therefrom:**
This subclass is indented under subclass 510. Subject matter which also contains a carboxylic acid or derivative reactant or polymer derived therefrom.
- 515 Mixed with additional aldehyde or aldehyde-type solid polymer; or specified intermediate condensation product; or aldehyde or aldehyde-type reactant:**
This subclass is indented under subclass 509. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one amine and/N or N-containing reactant and at least one aldehyde or aldehyde-type reactant is mixed with an additional aldehyde or aldehyde-type solid polymer or a specified intermediate condensate, or aldehyde or aldehyde-type reactant (X is chalcogen).
- 516 Contains a phenolic reactant or polymer thereof:**
This subclass is indented under subclass 515. Subject matter which contains a phenolic reactant or polymer thereof.
- 517 Amine-, N or N- containing reactant-aldehyde or -aldehyde-type polymer or condensation product contains atoms other than C, H, O, N, or S (X is chalcogen):**
This subclass is indented under subclass 515. Subject matter wherein the amine-, N or N-containing reactant aldehyde, -aldehyde-type solid polymer or specified intermediate condensation product contains an atom other than carbon, hydrogen, oxygen, nitrogen, or sulfur (X is chalcogen).
- 517.5 Mixed with a reactant which is a fatty acid glycerol ester, a fatty acid or salt derived from a naturally occurring glyceride, tall oil, or a fatty acid derived from tall oil; or the reaction product of any of the above with a polycarboxylic acid or ester forming derivative and a polyhydroxy compound:**
This subclass is indented under subclass 509. Subject matter wherein a reactant which is a fatty acid glyceride, a fatty acid derived from a naturally occurring glyceride, tall oil, or a fatty oil or salt thereof or a reaction product of any of these materials with a polycarboxylic acid or ester and a polyol.
- (1) Note. The so-called oil modified alkyl resins are treated herein in the same manner as fatty glycerides or the fatty acid derived therefrom.
- (2) Note. Dehydrated castor oil fatty acids are included herein.
- (3) Note. See Lines With Other Classes and Within This Class, section II. B(6) for a discussion of the lines between this subclass and other areas.
- SEE OR SEARCH CLASS:**
520, Synthetic Resins or Natural Rubbers, the Glossary, for a definition of the term "fatty acid" and of other materials proper for this subclass.
- 518 Mixed with unsaturated reactant or polymer derived therefrom:**
This subclass is indented under subclass 509. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one amine-, N or N-containing reactant and at least one aldehyde or aldehyde-type reactant is mixed with an ethylenically unsaturated reactant or polymer derived therefrom (X is chalcogen).
- 519 Mixed with carboxylic acid or derivative reactant or polymer therefrom:**
This subclass is indented under subclass 509. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one amine-, N or N-containing reactant and at least one aldehyde or aldehyde-type reactant is mixed with a carboxylic acid or derivative or polymer derived therefrom (X is chalcogen).
- 520 Contains -N=C=X reactant or polymer therefrom (X is chalcogen):**
This subclass is indented under subclass 519. Subject matter which contains a N=C=X reactant or polymer derived therefrom (X is chalcogen).
- 521 Solid polymer or specified intermediate condensation product derived from at least one**

ketone reactant and at least one aldehyde or aldehyde derivative reactant:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer or specified intermediate condensation product derived from at least one ketone reactant and at least one aldehyde or aldehyde derivative or polymer thereof as reactant, with additional solid polymer, with additional specified intermediate condensation product, with specified polymer-forming ingredients or with ethylenic agent; processes of mixing solid polymer derived from at least one ketone reactant and at least one aldehyde reactant with a chemical treating agent; or processes of forming or reacting or products resulting from any of the above mixtures.

- (1) Note. In this and indented subclasses a condensate of a ketone reactant and an aldehyde or aldehyde derivative reactant must be a solid polymer in order for a mixture of a ketone-aldehyde condensate and a chemical treating agent to be classified herein. A mixture would be placed in Class 528. See the Glossary and (1) note of subclass 480 of this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

480, the Note, for further elucidation.

SEE OR SEARCH CLASS:

528, Synthetic Resins or Natural Rubbers, the Glossary, for a mixture of a non-solid ketone-aldehyde condensate and a chemical treating agent, such as a catalyst.

522 Mixed with reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 521. Subject matter wherein a solid polymer or specified intermediate condensation product derived from at least one ketone and at least one aldehyde or derivative reactant is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

523 Solid polymer contains more than one 1,2-epoxy group or is derived from reactant containing at least one 1,2-epoxy group:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer containing more than one 1,2-epoxy group per mole or solid polymer derived from a reactant containing at least one 1,2-epoxy group with additional solid polymer, with specified polymer-forming ingredients, with chemical treating agent, or with ethylenic agent; or products resulting from the above mixing processes.

524 Mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom:

This subclass is indented under subclass 523. Subject matter wherein a solid polymer derived from reactant containing at least one 1,2-epoxy group or solid polymer containing more than one 1,2-epoxy group is mixed with a reactant containing more than one 1,2-epoxy group per mole or polymer derived therefrom.

525 Wherein at least one of said 1,2-epoxy reactants or polymer derived therefrom contains atoms other than C, H, or O:

This subclass is indented under subclass 524. Subject matter wherein at least one of said 1,2-epoxy reactants or polymer derived therefrom contains an atom other than carbon, hydrogen, or oxygen.

526 Contains nitrogen atom:

This subclass is indented under subclass 525. Subject matter wherein at least one of the 1,2-epoxy containing reactants or polymers contains nitrogen.

527 Contains halogen atom:

This subclass is indented under subclass 525. Subject matter wherein at least one of the 1,2-epoxy containing reactants or polymers contains halogen.

528 Mixed with -N=C=X-containing reactant or polymer therefrom:

This subclass is indented under subclass 523. Subject matter wherein a solid polymer containing more than one 1,2-epoxy group or derived from reactant containing at least one 1,2-epoxy group is mixed with an -N=C=X-

containing reactant or polymer derived therefrom (X is chalcogen).

529 Mixed with unsaturated reactant or polymer derived therefrom:

This subclass is indented under subclass 523. Subject matter wherein a solid polymer containing more than one 1,2-epoxy group or derived from reactant containing at least one 1,2-epoxy group is mixed with an ethylenically unsaturated reactant or polymer derived therefrom.

530 Wherein unsaturated reactant is a carboxylic acid or derivative or polymer derived therefrom:

This subclass is indented under subclass 529. Subject matter wherein the unsaturated reactant or polymer derived therefrom is a carboxylic acid or derivative.

531 Wherein unsaturated reactant contains only one free carboxyl group:

This subclass is indented under subclass 530. Subject matter wherein an unsaturated reactant contains only one free carboxylic acid group.

- (1) Note. This subclass provides, for example, mixtures of solid polymeric polyepoxides and either the monoester of an unsaturated di-carboxylic acid or an unsaturated monocarboxylic acid.

532 Contains polyol reactant or polymer derived therefrom:

This subclass is indented under subclass 530. Subject matter which contains polyhydroxy-containing reactant or polymer derived therefrom.

533 Mixed with carboxylic acid or derivative reactant or polymer therefrom:

This subclass is indented under subclass 523. Subject matter wherein a solid polymer containing more than one 1,2-epoxy groups or derived from reactant containing at least one 1,2-epoxy group is mixed with a carboxylic acid or derivative reactant or polymer derived therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

403, through 409 for solid polymer derived from 1,2-epoxy compounds contain-

ing only one 1,2-epoxy group as only reactant, wherein said reactants do not contain plural methylol or plural methylol derivative groups.

534 Solid polymer derived from phenolic reactant:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from a phenolic reactant with additional solid polymer, with specified polymer-forming ingredients, with chemical treating agent, or with ethylenic agent; or products resulting from the above mixing processes.

535 Solid polymer derived from sulfur-containing reactant:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from a sulfur-containing reactant with additional solid polymer with specified polymer-forming ingredients, specified intermediate condensation product, with chemical treating agent, or with an ethylenic agent; or products resulting from the above mixing processes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

537, for a process of mixing a solid polyphenylene sulfide with a chemical treating agent, with an additional solid polymer, with polymer-forming ingredients, or with an ethylenic agent when the disclosure is silent as to the mode of preparation of the polyphenylene sulfide or when such polymer is disclosed as being the reaction product of an alkali metal sulfide and a halogenated aromatic reactant.

536 Solid polymer derived from sulfur dioxide and ethylenically unsaturated reactant:

This subclass is indented under subclass 535. Subject matter wherein the solid polymer is derived from the reaction of sulfur dioxide and an ethylenically unsaturated reactant.

537 Solid polymer derived from alkali metal sulfide and halogenated aromatic reactant, e.g., polyarylene sulfide, etc.:

This subclass is indented under subclass 535. Subject matter wherein the solid polymer is derived from the reaction of an alkali metal sulfide-containing reactant and a halogenated aromatic reactant.

- (1) Note. This subclass includes polymers such as polyphenylene sulfide. In the event that the patent is silent with regard to how the polymer is prepared it will be assumed that it is prepared from an alkali metal sulfide and a halogenated aromatic reactant and will be placed herein.

538 Solid polymer derived from phosphorus-containing reactant:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from a phosphorus-containing reactant with additional solid polymer, with specified polymer-forming ingredients, with chemical treating agent or with ethylenic agent; processes of reacting the above mixtures or products resulting from the above mixing processes.

539 Solid polymer derived from at least one unsaturated reactant and at least one saturated reactant:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from at least one ethylenically unsaturated reactant and at least one saturated reactant, with additional solid polymer, with specified polymer-forming ingredients, with chemical treating agent or with ethylenic agent; or products resulting from the mixing processes.

540 Solid polymer derived from nitrogen-containing reactant:

This subclass is indented under subclass 50. Subject matter involves processes of mixing a solid polymer derived from a nitrogen-containing reactant with additional solid polymer, with specified polymer-forming ingredients, with chemical treating agent or with ethylenic agent; or products resulting from the above mixing processes.

CROSS-REFERENCE ART COLLECTIONS

901 RADIAL BLOCK:

Subject matter under Class 525 involving a radial block copolymer.

902 CORE-SHELL:

Subject matter under Class 525 involving a core-shell copolymer.

903 INTERPENETRATING NETWORK:

Subject matter under Class 525 involving polymers consisting of an interpenetrating network.

904 ACTIVATION OF PREFORMED POLYMER IN ABSENCE OF MONOMER, FOR SUBSEQUENT POLYMERIZATION THEREON (E.G., TRAPPED RADICALS):

Subject matter under Class 525 which involves the activation of a preformed polymer, in the absence of a monomer, for subsequent polymerization therein.

905 POLYPHENYLENE OXIDE:

Subject matter under Class 525 involving a polyphenylene oxide polymer.

906 POLYSULFONE:

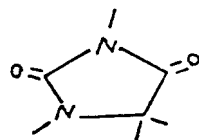
Subject matter under Class 525 involving a polysulfone polymer.

907 POLYCARBODIIMIDE:

Subject matter under Class 525 involving a polycarbodiimide polymer.

908 POLYMER CONTAINING A HYDANTOIN GROUP:

Subject matter under Class 525 involving a polymer containing the hydantoin group, i.e.,



909 POLYMER HAVING A HETEROCYCLIC RING WITH AT LEAST THREE DIFFERENT ELEMENTS WITHIN THE RING:

Subject matter under Class 525 involving a polymer containing a heterocyclic ring with at least three different elements within the ring.

- 910 POLYMER FROM ETHYLENIC MONOMERS ONLY, HAVING TERMINAL UNSATURATION:**
Subject matter under Class 525 involving an ethylenically polymerized polymer with terminal unsaturation.
- 911 POLYMER FROM ETHYLENIC MONOMERS ONLY, HAVING TERMINAL FUNCTIONAL GROUP OTHER THAN UNSATURATION:**
Subject matter under Class 525 involving a polymer derived from ethylenic monomers only and having saturated terminal functional groups.
- 912 POLYMER FROM NONETHYLENIC MONOMERS ONLY, HAVING PENDANT UNSATURATED GROUP:**
Subject matter under Class 525 involving a polymer derived from monoethylenic monomers only, having a pendant unsaturated group.
- 913 POLYMER OF ETHYLENIC MONOMERS HAVING PENDANT GLYCIDYL GROUP:**
Subject matter under Class 525 involving a polymer derived from ethylenic monomers having a pendant glycidyl group.
- 914 POLYMER FROM CONJUGATED DIENE HYDROCARBONS OR HALOHYDROCARBONS HAVING MORE THAN 50% 1,2- MICROSTRUCTURE:**
Subject matter under Class 525 involving a polymer derived from conjugated diene hydrocarbon or conjugated halogenated diene hydrocarbon, said polymer having more than 50 1,2-microstructure.
- 915 POLYMER FROM MONOETHYLENIC CYCLIC HYDROCARBON:**
Subject matter under Class 525 involving a polymer derived from a monoethylenic cyclic hydrocarbon.
- 916 POLYMER FROM ETHYLENIC MONOMERS ONLY, HAVING CATIONIC GROUP:**
Subject matter under Class 525 involving a polymer derived from ethylenic monomers only, having a cationic group.
- 917 POLYMER FROM AT LEAST ONE NON-ETHYLENIC MONOMER HAVING CATIONIC GROUP:**
Subject matter under Class 525 involving a polymer prepared by cationic polymerization.
- 918 POLYMER PREPARED BY CATIONIC POLYMERIZATION:**
Subject matter under Class 525 involving a polymer prepared by cationic polymerization.
- 919 IONOMER RESINS (CARBOXYLATE SALT-CONTAINING COPOLYMERS):**
Subject matter under Class 525 involving a polymer containing a carboxylate salt group (e.g., ionomer resins, etc.).
- 920 POLYURETHANE HAVING TERMINAL ETHYLENIC UNSATURATION:**
Subject matter under Class 525 involving a polyurethane polymer with terminal ethylenic unsaturation.
- 921 POLYESTER HAVING TERMINAL ETHYLENIC UNSATURATION OTHER THAN POLYESTERURETHANES:**
Subject matter under Class 525 involving a polyester with terminal ethylenic unsaturation, said polymer being other than polyesterurethanes.
- 922 POLYEPOXIDE HAVING BEEN REACTED TO YIELD TERMINAL ETHYLENIC UNSATURATION:**
Subject matter under Class 525 involving a polyepoxide which has been reacted to yield a polymer with terminal ethylenic unsaturation.
- 923 AMINOPLAST HAVING TERMINAL ETHYLENIC UNSATURATION:**
Subject matter under Class 525 involving an aminoplast with terminal ethylenic unsaturation.
- 924 PHENOPLAST HAVING TERMINAL ETHYLENIC UNSATURATION:**
Subject matter under Class 525 involving a phenoplast with terminal ethylenic unsaturation.
- 925 POLYMER FROM AT LEAST ONE NON-ETHYLENIC MONOMER HAVING TERMINAL ETHYLENIC UNSATURATION**

- OTHER THAN POLYURETHANES, POLYESTERS, POLYEPOXIDES, AMINOPLASTS, AND PHENOPLASTS:**
Subject matter under Class 525 involves a polymer derived from at least one nonethylenic monomer and which polymer has terminal ethylenic unsaturation and is other than a polurethane, polyester, polyepoxide, aminoplast, or phenoplast.
- 926 POLYAMIDE CONTAINING A PLURALITY OF OXYALKYLENE GROUPS:**
Subject matter under Class 525 involves a polyamide mixed with a polymer containing oxyalkylene groups.
- 927 POLYAMIDE ADMIXED WITH OXYALKYLENE CONTAINING POLYMER:**
Subject matter under Class 525 involves a polyamide mixed with a polymer containing oxyalkylene groups.
- 928 POLYIMIDE OR POLYAMIDE-ACID FORMED BY CONDENSATION OF A POLYAMINE WITH A POLYCARBOXYLIC ACID HAVING AT LEAST THREE CARBOXYL GROUPS OR DERIVATIVES THEREOF:**
Subject matter under Class 525 involves a polyimide- or polyamide-acid formed by the condensation of a polyamine with a polycarboxylic acid having at least 3 carboxyl groups, anhydride thereof, or derivative thereof.
- 929 POLYIMIDE FORMED BY ADDITION OF POLYAMINE TO AN UNSATURATED BIS-IMIDE:**
Subject matter under Class 525 involves a polyimide formed by the addition of a polyamine to an unsaturated bis-imide.
- 930 REACTION PRODUCT OF A POLYHYDRIC PHENOL AND EPICHLOROHYDRIN OR DIEPOXIDE, HAVING A MOLECULAR WEIGHT OF OVER 5,000 (E.G., PHENOXY RESINS):**
Subject matter under Class 525 involves a reaction product of a polyhydric phenol and an epichlorohydrin diepoxide, which reaction product has a molecular weight of over 5,000 (e.g., phenoxy resins, etc.).
- 931 BLEND OF STATED INCOMPATIBILITY:**
Subject matter under Class 525 involves a polymeric mixture wherein the ingredients are generally incompatible with one another.
- 932 BLEND OF MATCHED OPTICAL PROPERTIES:**
Subject matter under Class 525 involves a polymeric mixture with matched optical properties.
- 933 BLEND OF LIMITED GAS PERMEABILITY:**
Subject matter under Class 525 involves a polymeric mixture with limited gas permeability.
- 934 POWDERED COATING COMPOSITION:**
Subject matter under Class 525 involves a powdered coating composition.
- 935 MATRIX ADMIXED WITH SYNTHETIC FIBER:**
Subject matter under Class 525 involves a matrix mixed with a synthetic fiber.
- 936 ENCAPSULATED CHEMICAL AGENT:**
Subject matter under Class 525 involves an encapsulated chemical treating agent.
- 937 UTILITY AS BODY CONTACT (IMPLANT, CONTACT LENS, I.U.D., ETC.):**
Subject matter under Class 525 involves a polymer which has utility as a body contact material (e.g., implant, contact lens, etc.).
- 938 POLYMER DEGRADATION:**
Subject matter under Class 525 involves a polymer degradation.
- 939 MULTIPACKAGE SYSTEM:**
Subject matter under Class 525 involves a multipackaged system.
- 940 HYDROGENATION OF A POLYMER:**
Subject matter under Class 525 involves a hydrogenated polymer.
- 941 POLYMER MIXTURE CONTAINING BLOCK COPOLYMER IS MIXED OR**

**REACTED WITH CHEMICAL TREAT-
ING AGENT:**

Subject matter under Class 525 involves a polymeric mixture which contains a block copolymer and which is further mixed or reacted with a chemical treating agent.

**942 POLYMER DERIVED FROM NITRILE,
CONJUGATED DIENE AND AROMATIC
CO-MONOMERS:**

This subclass is indented under the class definition. Subject matter involving a polymer derived from ethylenic reactants only derived from a nitrile, conjugated nonaromatic hydrocarbon and aromatic hydrocarbon, e.g., included herein are the "ABS" resins, grafts, blocks, and any other combination proper for Class 525, etc.

SEE OR SEARCH CLASS:

526, Synthetic Resins or Natural Rubbers, subclasses 335+ for a polymer derived from hydrocarbon monomer containing at least two ethylenic groups.

END